Department of the Army
Pamphlet 73–1

Test and Evaluation

Test and Evaluation in Support of Systems Acquisition

Headquarters
Department of the Army
Washington, DC
30 May 2003

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SUMMARY of CHANGE

DA PAM 73–1
Test and Evaluation in Support of Systems Acquisition

This Army pamphlet implements the policies contained in Army Regulation 73-1. Specifically it--

- Consolidates seven Department of the Army pamphlets: DA Pamphlet 73-1, 73-2, 73-3, 73-4, 73-5, 73-6, and 73-7.
- Provides an overview of the test and evaluation (T&E) process in support of Army systems acquisition (chap 1).
- Describes the T&E Working-level Integrated Product Team (chap 2).
- Provides detailed guidance and procedures for the preparation, staffing, and approval of the Test and Evaluation Master Plan (TEMP) (chap 3).
- Provides an overview of the Army Critical Operational Issues and Criteria (COIC) development and approval processes (chap 4).
- Provides an overview of the Army System Evaluation and System Assessment process (chap 5).
- Provides an overview of Army developmental and operational testing processes (chap 6).

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Test and Evaluation in Support of Systems Acquisition

By Order of the Secretary of the Army:

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History. This publication is a major revision.

Summary. This pamphlet provides guidance and procedures to implement test and evaluation policy for materiel and information technology systems as promulgated by AR 73–1. It outlines the basic Army test and evaluation philosophy; general test and evaluation guidance in support of materiel systems acquisition and information technology systems acquisition; test and evaluation guidance in support of system modifications and nondevelopmental items; the Test and Evaluation Working-level Integrated Product Team; preparation, staffing and approval of the Test and Evaluation Master Plan; detailed guidance on preparation, staffing, and approval of critical operational issues and criteria, to include key performance parameters; guidance on the planning, conduct, and reporting of system evaluation; and guidance on the planning, conduct, and reporting of testing (that is, developmental and operational), to include test support packages, test incidents, corrective actions, instrumentation, targets, and threat simulators.

Applicability. The provisions of this pamphlet apply to the Active Army, the Army National Guard of the United States, and the U.S. Army Reserve. This pamphlet is not applicable during mobilization.

Proponent and exception authority. The proponent of this pamphlet is the Deputy Under Secretary of the Army (Operations Research). The Deputy Under Secretary of the Army (Operations Research) has the authority to approve exceptions to this pamphlet that are consistent with controlling law and regulation. The Under Secretary of the Army may delegate this approval authority, in writing, to a division chief within the proponent agency who holds the grade of colonel or the civilian equivalent.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the Chief of Staff of the Army, Test and Evaluation Management Agency (DACS–TE), 200 Army Pentagon, Washington, DC 20310–0200.

Distribution. This publication is available in electronic media only and is intended for command levels A, B, C, D, and E for the Active Army, the Army National Guard of the United States, and the U.S. Army Reserve.

Contents (Listed by paragraph and page number)

*This pamphlet supersedes DA Pamphlet 73–1, 28 February 1997; DA Pamphlet 73–2, 11 October 1996; DA Pamphlet 73–3, 1 March 1996; DA Pamphlet 73–4, 1 March 1997; DA Pamphlet 73–5, 30 September 1997; DA Pamphlet 73–6, 30 September 1996, DA Pamphlet 73–7, 25 July 1997.

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Chapter 1
Introduction

1–1. Purpose

The primary purpose of test and evaluation (T&E) is to support system development and acquisition by serving as a feedback mechanism in the iterative systems engineering process. This pamphlet provides guidance and procedures to implement T&E policy for materiel and information systems with regard to planning, executing, and reporting T&E in support of the acquisition process as promulgated by Army Regulation (AR) 73–1. Developing and deploying Army systems that are operationally effective, suitable, and survivable represents a significant challenge to all involved in the systems acquisition process. The procedures and guidelines in this pamphlet apply to—

a. All systems developed, acquired, and managed under the auspices of Department of Defense (DOD) Directive (DODD) 5000.1, DOD Instruction (DODI) 5000.2, and AR 70–1; these systems are referred to as materiel and Command, Control, Communications, Computers, and Intelligence/Information Technology (C4I/IT); and AR 40–60; these systems are referred to as medical systems.

b. All systems managed and certified for interoperability under the auspices of DODD 4630.5, DODI 4630.8, and Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6212.01B.

c. All special access programs (SAP) under the auspices of AR 380–381.

d. Materiel developers (MATDEV), combat developers (CBTDEV), functional proponents for non-tactical C4I/IT systems, training developers (TNGDEV), threat analysts, developmental testers, operational testers, system evaluators, HQDA staffers, and all others involved in the T&E of systems during acquisition. The term MATDEV when used in this pamphlet includes program, project, and product managers (PM) and their staffs unless otherwise stated. The term CBTDEV includes functional proponents unless otherwise stated.

1–2. References

Required and related publications and prescribed and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms

Abbreviations and special terms used in this pamphlet are explained in the glossary.

1–4. Test and evaluation roles and responsibilities

A fully coordinated and integrated T&E effort is essential for timely, effective, and efficient T&E. The Deputy Under Secretary of the Army (Operations Research), DUSA(OR), has oversight on all T&E policy and procedural issues for the Army. Army Regulation (AR) 73–1 provides the current T&E roles and responsibilities in support of acquisition of Army systems.

1–5. Overview of test and evaluation support

All acquisition programs are based on the identification of mission needs that only have a materiel solution. A mission needs analysis identifies the need for a new operational capability or improvement to an existing capability. One of the fundamental elements of the acquisition process is T&E. Figure 1–1 depicts the defense acquisition model in DODI 5000.2.

a. The systems acquisition model is divided into three activities: Pre-Systems Acquisition, Systems Acquisition, and Sustainment. Activities are divided into the following phases: technology development (Post Milestone A), system development and demonstration (Post Milestone B), production and deployment (Post Milestone C), and operations and support. A detailed description of the phases, milestones, and life-cycle activities for the acquisition Life Cycle Model for all programs (that is, materiel and C4I/IT systems) is contained in DODI 5000.2. Programs may enter the model at various points during Pre-Systems Acquisition and Systems Acquisition. Under an evolutionary acquisition strategy, each subsequent increment beyond the first (that is, Increments 2 and 3), will follow the systems acquisition activities (that is, engineering and manufacturing development, demonstration, low-rate initial production (LRIP), and production). Army T&E has the flexibility to support any acquisition strategy appropriate for the acquisition program under consideration. The structuring and execution of an effective T&E program is absolutely essential to the development and deployment of Army systems that are operationally effective, suitable, and survivable while meeting the user's requirements.

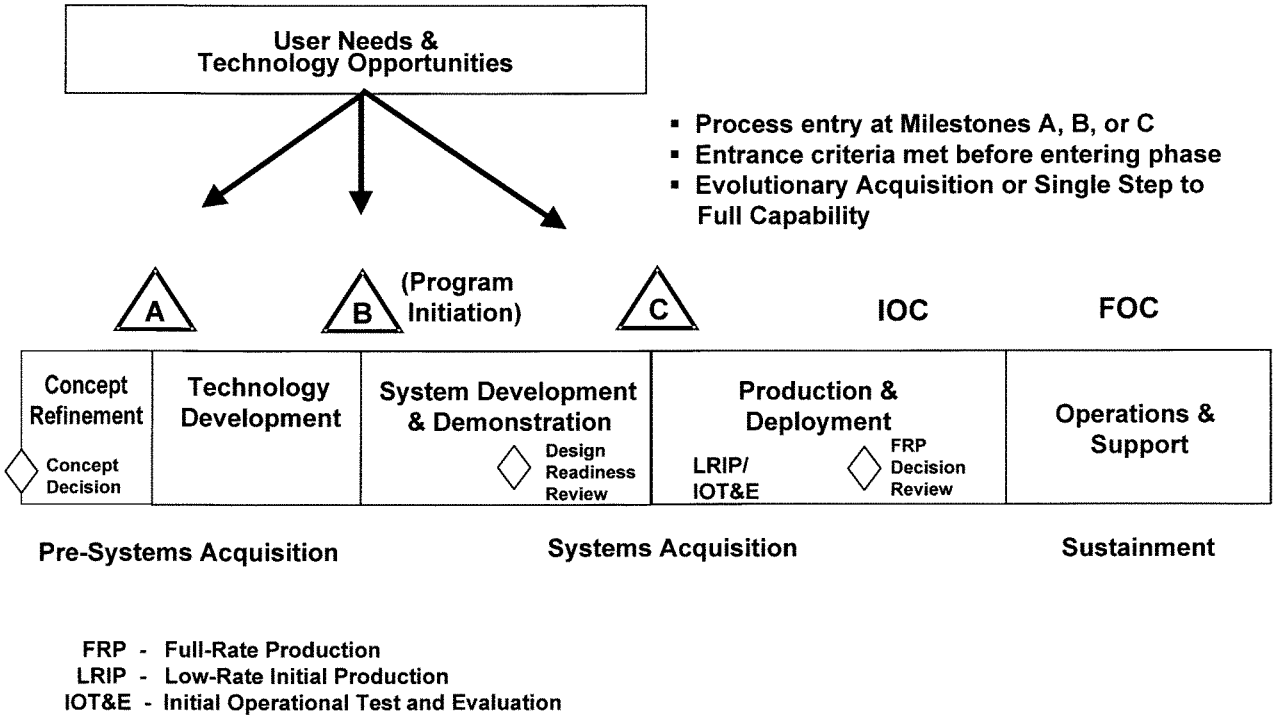


Figure 1–1. DOD 5000 systems acquisition model

b. DODD 5000.1 requires that T&E be closely integrated with requirements definition, threat projections, systems design and development, and support the user through assessments of a system's contribution to mission capabilities and support the defense acquisition process. T&E is the principal tool with which progress in system development is measured. The complexity of weapon systems, coupled with the need to reduce time and cost, demands that T&E programs be integrated throughout the acquisition process. Much of the information contained in independent evaluations and assessments is based on data generated from testing. It is Army policy that T&E programs be structured to integrate all developmental testing (DT), operational testing (OT), live fire testing (LFT), modeling and simulation (M&S), and other credible data generation activities appropriate to system evaluation. Integrated test and evaluation (IT&E) serves as an efficient, integrated continuum that obtains necessary, authenticated data from many sources. This is accomplished to provide maximum benefit from a complete, unified T&E program by using resources efficiently to shorten acquisition time and determine whether systems are operationally effective, suitable, and survivable for their intended use. Both developmental and operational testers, in concert with the system evaluator, assist the MATDEV, CBTDEV, and TNGDEV in developing an integrated T&E strategy that optimizes the use of all testing, M&S, and other credible events as appropriate to the system.

c. The information generated as a result of T&E (for example, reports based upon test data, M&S data, and associated analyses) influences many of the actions taken during the system acquisition process and supports milestone decisions. Planning for T&E begins at the earliest stages of the system requirements, development, and acquisition processes. T&E can also reduce costs associated with upgrades, retrofits, and modernization by exposing problems that can be fixed prior to producing large numbers of items.

d. T&E provides information to—

(1) Decision-makers responsible for procuring effective, suitable, and survivable systems.

(2) MATDEV for identifying and resolving technical and logistical issues.

(3) Managers for making the best use of limited resources.

(4) Operational users (for example, CBTDEV, trainers, and logisticians) for refining requirements and supporting development of effective doctrine, organization, training, and tactics, techniques, and procedures (TTP) for the system being acquired.

(5) The Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) to aid in the development of Joint Munitions Effectiveness Manuals (JMEMs) used by operational forces and mission planners.

e. System contractors use T&E information to ensure compliance with contractually required specifications (for

example, product definition data) and to detect manufacturing or quality deficiencies. System contractors often use test tools to ensure compatibility early in the development process to mitigate schedule slippages by early identification of problems.

f. Accredited models and simulations (M&S) are employed throughout the life cycle to support requirements definition; design and engineering; test planning, rehearsal, and conduct; result prediction; manufacturing; logistics support; training, and to include supplementing actual T&E. The Army has established verification, validation, and accreditation (VV&A) procedures for the use of M&S in support of T&E. These procedures can be found at http://www.army.mil/usapa/epubs/pdf/p5_11.pdf. Computer-based M&S supports force-on-force; live fire; threat representation; synthetic, natural, and manmade environments; system operational and inter-operational loading (stimulation); and early examination of soldier interface and mission capabilities, when live operations are either unsafe or resource prohibitive. In addition, force level M&S and/or soldier in the loop virtual simulations may be used to extend live test findings to provide needed insight and data for system evaluation.

g. Army T&E policy provides the flexibility to allow each acquisition program to tailor a T&E strategy to achieve maximum support to the program. Hence, structuring a sound and efficient T&E program early in the system acquisition process is critical to the success of the program.

1–6. Basic test and evaluation elements

Army T&E consists of several basic elements that are essential in the development and conduct of meaningful T&E. These basic elements are—

a. Test and Evaluation Working-level Integrated Product Team. The Test and Evaluation Working-level Integrated Product Team (T&E WIPT) is the cornerstone upon which a sound, effective T&E strategy is built and executed. The T&E WIPT assists the CBTDEV in the requirements generation process and MATDEV (or a PM, once established) in planning and managing the T&E throughout a system's life cycle. The primary objectives of the T&E WIPT are to provide for the basic planning for all life cycle T&E, identifying and resolving issues early, understanding the issues and the rationale for the approach, and assist the PM/MATDEV in producing a Test and Evaluation Master Plan (TEMP) that is acceptable to all organizational levels as quickly and as efficiently as possible. The T&E WIPT optimizes the use of appropriate T&E expertise, tools and instrumentation, facilities, simulations, and models to achieve T&E integration, thereby reducing costs to the Army and decreasing acquisition cycle time. A T&E WIPT will be established for every program, including SAP, to ensure that T&E integration is accomplished. The T&E WIPT is composed of representatives from all organizations that have a role or may have a potential role in the T&E process and chaired by the PM or MATDEV. The T&E WIPT will also tailor the T&E tools and strategy to maximize effectiveness and efficiency. Details on organizational T&E players, rules, goals, and chartering of a T&E WIPT are discussed in chapter 2 of this pamphlet.

b. Test and evaluation planning documents.

(1) *Test and Evaluation Master Plan*. The TEMP is the basic planning document for a system's life cycle that focuses on the overall structure, major elements, and objectives of the T&E program. The TEMP is the overarching T&E document for the many T&E planning, review, and reporting documents required of all acquisition programs. There is one TEMP for each acquisition system with the only exception being for investigational drugs, biologicals, and devices. A capstone TEMP is required for a program consisting of a collection of individual systems. The TEMP provides a road map for integrated simulation, test and evaluation plans, schedules, and resource requirements necessary to accomplish the T&E program. The TEMP relates program schedule, test management strategy and structure, and required resources to critical operational issues and criteria (COIC); ORD requirements; critical technical parameters (CTP); measures of effectiveness and suitability; and milestone decisions points. In order to ensure that a comprehensive system evaluation is conducted, the TEMP identifies and describes test events (that is, developmental, operational, and certification), M&S, and data collection (for example, baseline data from training exercises), as well as test resources, that are needed to satisfy Key Performance Parameters (KPP), COIC, measures of performance (MOP), measures of effectiveness (MOE), and measures of suitability (MOS) from the system Mission Need Statement (MNS) and ORD. Additionally, the organization(s) conducting the test events, M&S, and data collection are identified. The TEMP documents the T&E strategy and is initially developed for Milestone (MS) B. The TEMP is then updated before each MS and the FRP Decision Review, when the program has changed significantly, when the program baseline has been breached, or when the associated ORD or C4I Support Plan (C4ISP) has been significantly modified. The TEMP is consistent with the acquisition strategy and the approved MNS, ORD, and C4ISP. Additionally, the TEMP is a reference document used by the T&E community to generate detailed T&E plans and to ascertain T&E schedule and resource requirements associated with a given system. An Army approved TEMP is required before commitment of T&E resources. All T&E WIPT members contribute to the development and maintenance of the TEMP. The MATDEV (or PM) is responsible for the TEMP. Upon approval, the TEMP serves as a contract between the MATDEV, CBTDEV, and the T&E communities for executing the T&E strategy in support of the acquisition process to accommodate the unique characteristics and schedule of an acquisition program. Detailed TEMP procedures and format are in the Defense Acquisition Guidebook and chapter 3 of this pamphlet.

(2) *Critical operational issues and criteria*. Critical operational issues and criteria (COIC) define the bottom line operational expectations of the system at the FRP Decision Review. COIC reflect maturity expectations for the

accomplishment of critical mission(s) while considering the maturity of all doctrine, organizations, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) components at that stage in the acquisition. COIC are the key decision-maker operational concerns (issues) with standards of performance (criteria) that must be answered by the system evaluation to determine if the system is ready to enter full-rate production. COIC are the critical operational issues with associated scope, criteria, and rationale. COIC focus on mission accomplishment and reflect a just good enough system in the areas of training readiness, deployability, sustainability, and critical mission performance including survivability. A breach of a criterion is reason to delay entry into full-rate production unless other evidence of acceptable system operational effectiveness, suitability and survivability is provided. The criteria must relate to the ORD and the Analysis of Alternatives (AoA). Each ORD KPP will be a criterion. COIC are not usually separated into a set of categories such as effectiveness, suitability, and survivability. COIC by their very nature are overarching and will span such categories in a single issue or criterion. As appropriate, COIC will address the system-of-systems. COIC are initially developed and approved for the initial TEMP in support of MS B and are updated and approved for the MS C TEMP. Subsequent revisions of COIC occur for each increment under evolutionary acquisition and changes corresponding to a revised ORD. The approved COIC are included in the TEMP and are the basis for planning the system evaluation. Chapter 4 of this pamphlet discusses COIC in detail.

(3) *System Evaluation Plan*. The System Evaluation Plan (SEP) is the primary planning document for the independent system evaluation and assessment so as to ensure that only operationally effective, suitable, and survivable Army and multi-Service systems are delivered to the users. Critical to the decision making process is the availability of unbiased, objective evaluations and assessments of a system's capabilities. This is achieved by the use of evaluators who provide reports independent of the MATDEV and CBTDEV. System evaluation integrates experimentation, demonstration, and M&S information with available test data to address the evaluation issues (that is, CTPs, COIC and the Additional Issues developed by the system evaluator). Through the SEP, the need for testing is determined and unnecessary testing avoided. The SEP documents the evaluation strategy and overall test/simulation execution strategy (T/SES) of a system for the entire acquisition cycle through fielding. The detailed information contained in the SEP supports concurrent development of the TEMP. The SEP is focused on evaluation of the system in the context of mission accomplishment, performance, safety, health hazard, and operational effectiveness, suitability, and survivability. The system evaluator, in coordination with the T&E WIPT, prepares the SEP. Per DODI 5000.2, projects that undergo a Milestone A decision will have a test and evaluation strategy that will primarily address M&S and early experimentation, including identifying and managing the associated risk, and strategy to evaluate system concepts against mission requirements. Chapter 5 of this pamphlet discusses system evaluation in detail.

(4) *Event Design Plan*. The Event Design Plan (EDP) contains detailed information on event design, methodology, scenarios, instrumentation, simulation and stimulation, and all other requirements necessary to support the system evaluation requirements stated in the SEP. There will be one EDP for each primary data source identified in the SEP and TEMP. Chapters 5 and 6 of this pamphlet discuss system evaluation in detail.

c. Developmental testing (DT) and operational testing (OT).

(1) The DT is an incremental continuum of tests, synchronized with product development, with a progression to a full-up system test. Ideally, DT events will provide the venue to fully demonstrate product performance and stability resulting in a system qualified for successful OT. DT can include gradual increased user participation. DT is performed in controlled environments, on the target hardware in an operational-like environment, and encompasses M&S and engineering type tests. Engineering tests are used to minimize design risks; determine physical and performance limits; provide software, security, system safety and interoperability certifications; determine compliance with system specifications; determine achievement of functional requirements and critical technical parameters, and determine if the system is technically ready for OT and/or ready to enter the next acquisition phase. Per DODI 5000.2, the MATDEV/PM must formally certify that the system is ready for OT.

(2) The OT is a field test of a system or item to examine its operational effectiveness, suitability, and survivability. OT is conducted under realistic operational conditions with users who represent those expected to operate and maintain the system when it is fielded or deployed. An Initial Operational Test is a special form of an OT, which is conducted using production or production representative units.

(3) A combined DT/OT approach is encouraged to shorten the acquisition process and reduce cost. The MATDEV, along with the T&E WIPT, must assess technical risks associated with choosing the combined DT/OT approach since the risk of an unsuccessful OT increases when insufficient technical performance and reliability data are available before OT. The combined DT/OT approach will not compromise either DT or OT test objectives or circumvent DT or OT entrance/exit criteria.

d. System assessment and continuous evaluation.

(1) *System assessment*. System assessment (SA) reports occur at key points during the system acquisition phases, before and after each milestone decision. As the system approaches a milestone or the FRP decision review, the system evaluator will produce a System Evaluation Report (SER) to advise the decision review principals and milestone decision authority concerning the adequacy of testing, the system's operational effectiveness, suitability, and survivability, as well as recommendations for future T&E and system improvements. For a major defense acquisition program (MDAP), the system evaluation in support of the FRP decision review will use data resulting from the IOT as a major data source integrated with other credible data sources as defined in the SEP. System evaluation focuses on

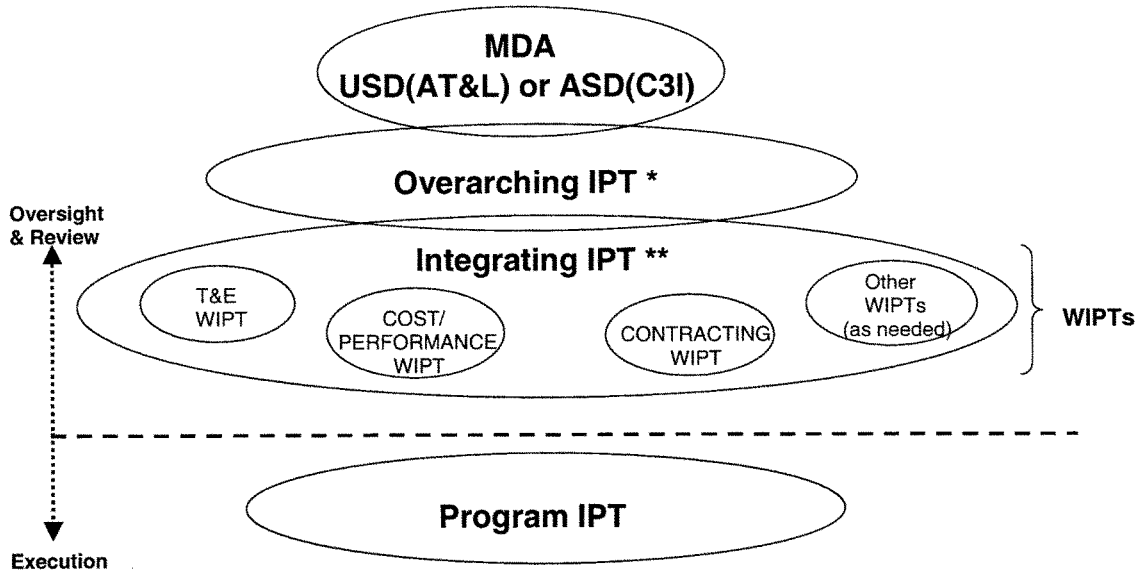
demonstrated system technical and operational characteristics, performance, and safety as a part of system operational effectiveness, suitability, and survivability. System assessment examines a system's existing and potential capability so as to identify risks particularly when there is continuing development effort. Details on the planning, conduct, and reporting of system evaluation/assessment and CE are in chapter 5 of this pamphlet.

(2) *Continuous evaluation*. Continuous evaluation (CE) is the process that provides a continuous flow of T&E information to all decision-makers and developers on the progress towards a system achieving full operational capabilities. The process encourages frequent assessments of a system's status during development of the initial system as well as subsequent increment improvements and can result in a significant cost savings and reduce acquisition time through comparative analysis and data sharing. CE also examines whether a system is operationally effective, suitable, and survivable and satisfies the mission needs. CE is employed on all system acquisition programs. Upon request, system evaluators provide independent system evaluations and assessments to MATDEV/PM, CBTDEV, and TNGDEV. While in cooperation with the MATDEV, CBTDEV and other T&E WIPT members, the system evaluator must operate independently to ensure complete objectivity. CE is a strategy that ensures responsive, timely, and effective assessments of the status of an acquisition. CE should start as early as the requirements analysis for materiel systems and as early as the Information Management Plan (IMP) for non-tactical C4I/IT systems, and continue through post-deployment system support activities. CE provides unbiased, objective evaluations and assessments of a system's capabilities, flaws, benefits, burdens, and risks critical to the development and decision making processes. CE is important for T&E to support the acquisition process.

Chapter 2
Test and Evaluation Working-level Integrated Product Team (T&E WIPT)

2–1. Integrated Product Team

a. DOD has adopted Integrated Product Teams (IPTs) as the preferred approach for the development, review, and oversight of the acquisition process. The IPT approach is to take advantage of all members' expertise, produce an acceptable product, and facilitate decision-making. PMs enhance the IPT process through: establishing IPT Plans of Action and Milestones (POA&M); proposing tailored documentation and milestone requirements; reviewing and providing early input to documents; resolving and elevating issues in a timely manner; and assuming responsibility to obtain principals' concurrence on issues, as well as with applicable documents or portions of documents. The POA&M provide a detailed understanding of key IPT activities, target dates, and deliverables. The POA&M is a management tool that complements the IPT Charter and communicates critical IPT objectives and the processes that will be used to achieve the overall system acquisition goals. Chartering an IPT, empowering qualified team members, training participants, aligning goals, open discussions, consistent team participation, resolving issues early, and preparing a POA&M provide a solid foundation to a successful and productive IPT. The "Rules of the Road: A Guide for Leading Successful Integrated Product Teams," 21 October 1999, provides guidelines for more effective IPT operations (available at http://www.acq.osd.mil/ap/21oct99rulesoftheroad.html). Figure 2–1 depicts the overall DOD IPT structure.



* Required for ACAT ID and IAM

** For each program, there should be an Integrating IPT(IIPT)and at least one Working- level IPT (WIPT). An IIPT coordinates WIPT efforts and covers all topics not otherwise assigned to a WIPT. WIPTs focus on specific topics, for example, test and evaluation, cost/performance, and contracting.

Figure 2–1. DOD IPT operational structure

b. At the OSD level, all ACAT ID and IAM programs will have an Overarching IPT (OIPT) to provide assistance, oversight, and review as the program proceeds through its acquisition life cycle. An appropriate official within OSD, typically the Director of Strategic and Tactical Systems or the Principal Director, Command, Control, Communications, Intelligence, Surveillance, and Reconnaissance and Space will lead the OIPT for acquisition category (ACAT) ID programs. The Deputy DOD Chief Information Officer (CIO) or designee will lead the OIPT for ACAT IAM programs. The OIPT will consist of the PM, PEO, Component Staff, Joint Staff, and OSD staff involved in the oversight and review of the particular ACAT ID or IAM program. A more detailed description of the operation of OIPT is in the Defense Acquisition Guidebook.

c. The PM or designee will form and chair an Integrating IPT (IIPT) to support the development of strategies for

acquisition and contracts, T&E, cost estimates, evaluation of alternatives, logistics management, and cost-performance trade-offs. An IIPT may be formed for all system acquisition programs. The PM or designee uses an IIPT to ensure that integration and coordination occur in order to properly address all aspects of the program's acquisition.

d. Working-level IPTs (WIPTs) are formed by the PM, or designee, through the IIPT process. The objective of a WIPT is to resolve as many issues and concerns at the lowest level possible, and to expeditiously escalate issues that need resolution at a higher level (that is, the Integrating IPT or OIPT), bringing only the highest level issues to the Milestone Decision Authority (MDA) for decision. Any unresolved issue should be addressed through the chain-of-command. In the Army, T&E policy and procedural issues will be brought forward through the Test and Evaluation Management Agency (TEMA) for DUSA(OR) adjudication.

e. WIPTs meet as required to help the PM plan program structure as well as document and resolve issues. WIPT can vary in size and serve as advisory bodies to the PM by assisting the PM in developing strategies and in program planning, as requested by the PM.

2–2. T&E WIPT overview

T&E integration is accomplished through the use of the T&E WIPT or the integrated test team if a T&E WIPT has not been established. The primary purpose of the T&E WIPT is to develop an integrated T&E strategy, as well as a coordinated program for M&S, developmental tests, and operational tests that will support a determination of whether or not a system is operationally effective, suitable, and survivable. The T&E WIPT operates within the IPT guidelines of the Defense Acquisition Guidebook, the USD(AT&L) "Rules of the Road—A Guide for Leading Successful Integrated Product Teams," dated 21 October 1999, AR 70–1, and Department of the Army Pamphlet (DA Pam) 70–3. The T&E WIPT is a team of qualified, motivated, and innovative members representing their respective organizations. The T&E WIPT meets (or otherwise provides a forum) to plan the necessary testing and evaluation strategies, identify and resolve issues early, understand the issues and rationale for the approach, and to produce a coordinated TEMP prior to approval. The T&E WIPT members are members of the acquisition team. They are both knowledgeable and empowered to represent the interests of their organization and will remain as a principal working group member throughout the system acquisition process. The emphasis is on the word "Team." As a team, it is extremely important that T&E WIPT members have defined roles, work interdependently while representing their functional area skills, and work in a trusting environment. Close coordination among the T&E WIPT members must be effected in a timely manner in order to optimize schedules and costs and preclude duplication or voids in the acquisition T&E cycle.

a. The T&E WIPT goals are to develop a mutually agreeable T&E program that will provide the necessary data for evaluations. T&E WIPTs provide support for the development, staffing, coordination, and approval of all required T&E documentation. T&E WIPTs establish the necessary subordinate working groups (for example, reliability, availability, and maintainability (RAM), LFT&E, and M&S subgroups) to develop a T&E strategy and address related T&E issues. T&E WIPTs ensure all participants have the opportunity to be involved. T&E WIPTs establish and manage the corrective action process; participate in the DT & OT test readiness reviews; and support CE and integrated T&E. The use of T&E WIPTs optimizes the use of appropriate T&E expertise, instrumentation, targets, facilities, and M&S to achieve T&E integration, thereby reducing costs to the Army and decreases acquisition cycle time and mutually resolving cost and scheduling problems. T&E WIPT members must ensure that their actions do not cause unnecessary resource requirements, which is the primary cause of program funding and scheduling challenges for PMs. The PM should be supportive of T&E resource requests that are reasonable and justifiable. T&E WIPTs ensure T&E planning, execution, and reporting are directed towards a common goal. T&E WIPTs provide a forum in which designated representatives from the participating organization can discuss freely each person's views on the program and test requirements. Recommendations and documents will be products of the T&E WIPT.

b. Planning for T&E begins at the earliest stages of development of user needs, science and technology, system requirements, development, and acquisition processes. The MATDEV for materiel and tactical C4I/IT programs will form T&E WIPTs after approval of the DOTMLPF Needs Analysis Report stating and justifying the materiel need but not later than core staffing of the draft ORD. For other than ACAT I and IA programs, the DOTMLPF Needs Analysis Report with a materiel need is equivalent to a MNS. For ACAT I or IA programs, the report justifies writing a MNS. For non-tactical C4I/IT programs, the MATDEV will form the T&E WIPT between the Business Process Reengineering Analysis and core staffing of the ORD (or ORD equivalent document if total program cost is less than $10 million). For programs with a Milestone A, the T&E WIPT must be established in time to develop, coordinate, and submit the Test and Evaluation Strategy to the approval authority. For programs without a MS A, a T&E WIPT needs to be established in sufficient time for the development, coordination, and approval of the initial TEMP in support of program initiation and the T&E portions of the request for proposal (RFP) and supporting documentation.

2–3. T&E WIPT membership

a. Organizations that have a role, or may have a potential role, in a program's T&E are extended invitations to the initial T&E WIPT meeting. Such organizations include but are not limited to the following—

(1) Principal members.

— MATDEV (program executive officer (PEO), program manger (PM), or other as appropriate).

— CBTDEV or functional proponent for non-tactical C4/IT.
— System evaluator.
— Developmental tester.
— Operational tester.
— Logistician (ASA(ALT) ILS or designated representative).
— Army Research Laboratory, Survivability/Lethality and Analysis Directorate.
— Training developer/trainer.
— Threat integrator (HQDA, Deputy Chief of Staff, G–2 (DCS, G–2) or designated representative).
— User's or test unit's resource coordinators.
— Any command or agency that has a role critical to the success of the program (such as, agencies that provide analysis, survivability, lethality, interoperability, NBC survivability, safety, health hazard, MANPRINT, transportability, IT, or other considerations).

(2) For HQDA TEMP approval programs, the following HQDA offices are included: DUSA(OR); ASA(ALT); ASA(ALT) ILS; DCS, G–1; DCS, G–2; DCS, G–3; DCS, G–4; DCS, G–8; and the Chief Information Officer/G–6 (CIO/G–6). Failure of any of these offices to provide representatives to attend the initial T&E WIPT (or declare intent not to participate in the T&E WIPT process) forfeits organizational inclusion in the coordination of the TEMP prior to HQDA approval.

(3) For OSD level TEMP approval programs, representatives from DOT&E and the cognizant OIPT leader (that is, DT&E or C4I) may participate in the T&E WIPT.

b. System contractors may be invited to the T&E WIPT to provide information, advice, and recommendations; however, the following policy will govern their participation.

(1) System contractors will not be formal members of the T&E WIPT.

(2) System contractor participation will be consistent with Section 5, Title 5, United States Code (5 USC 5), Appendix 2, which is based upon Public Law 92–463, "Federal Advisory Committee Act," 6 October 1972.

(3) System contractors may not be present during T&E WIPT deliberations on acquisition strategy or competition sensitive matters, nor during any other discussions that would give them a marketing or competitive advantage.

c. Support contractors may participate in T&E WIPT meetings, but they may not commit the organization they support to a specific position. The organizations they support are responsible for ensuring the support contractors are employed in ways that do not create the potential for an organizational conflict of interest.

d. There are three T&E WIPT core members: MATDEV, CBTDEV, and system evaluator. T&E WIPT meetings should be scheduled to accommodate all core members. At the conclusion of the initial T&E WIPT meeting, those organizations that are essential to the success of the T&E WIPT will be identified. A T&E WIPT Charter will identify organizational representatives as either a principal or associate member.

2–4. T&E WIPT Charter

The MATDEV/PM, regardless of ACAT level, will charter the T&E WIPT. The charter documents the mission and products of the T&E WIPT and establishes the timeframe in which the effort is to be completed. It establishes the membership, scope, objectives, and procedures of the T&E WIPT. A sample format is depicted at figure 2–2. The charter is finalized based on the initial T&E WIPT meeting and approved by the PM or MATDEV command only upon concurrence by the principal T&E WIPT members. See paragraph 2–3*a*(1) for a list of potential principal members. A copy of the approved charter is provided to each of the T&E WIPT members. While chaired by the PM or MATDEV, the T&E WIPT members will be composed of qualified T&E representatives empowered to speak and act on behalf of their organization.

2–5. Essential role of the T&E WIPT

a. The T&E WIPT objectives are to identify and resolve issues early, understand the issues and the rationale for the approach, and document a quality TEMP that is acceptable at all organizational levels as quickly and as efficiently as possible. All documents should be delivered in a timely manner to keep pace with the system's T&E and acquisition schedules. The T&E WIPT will—

(1) Be established and chaired by the PM, MATDEV, or designated representative to assist with the development of the post-MS A Test and Evaluation Strategy, if applicable, and the CTP, COIC, and TEMP in support of program initiation. To ensure an integrated effort, the T&E WIPT must coordinate with other WIPTs.

(2) Integrate T&E requirements and accelerate the TEMP coordination process by producing a coordinated TEMP, resolving cost and schedule problems, and determining test data requirements.

(3) Provide a forum to assist personnel responsible for T&E documentation and execution, and ensure that T&E planning, execution, and reporting are directed toward common goals. The T&E WIPT will be the forum through which T&E coordination among all members of the acquisition team, to include the system contractor, is accomplished. Minority opinions will be documented.

(4) Immediately elevate disagreement on matters of substance through the IIPT or command channels to the next

higher level for resolution. Unresolved T&E issues will be brought through the proper chain-of-command to the DUSA(OR) for adjudication.

(5) Establish necessary subgroups to address related T&E issues and action items. Subgroup members will normally be responsible for those T&E issues and action items related to their particular functional area that are specified on an Action Item List (AIL). The AIL will be revised by organizational representatives at each subgroup meeting and become part of the minutes.

(6) Support the CE process by accomplishing early, more detailed, and continuing T&E documentation, planning, integration, and promote the sharing of data.

(7) Within their area of expertise, assist in preparing the T&E portions of the acquisition strategy, the RFP, and related contractual documents, and assist in evaluating contractor or developer proposals when there are T&E implications.

(8) Operate under the spirit and principles of the IPT and integrated product and process management (IPPM) or integrated product and process development (IPPD). The T&E WIPT will adhere to principles in the Defense Acquisition Guidebook to include: open discussion, proactive participation, empowerment, and early identification and resolution of issues.

(9) Coordinate on requests for waivers of testing in an approved TEMP.

b. Minutes of all T&E WIPT meetings will be prepared by the T&E WIPT chairperson and distributed within 10 working days.

2–6. T&E WIPT meetings

T&E WIPT meetings encompass activities such as development and coordination of the TEMP to include resolution of issues whenever possible, coordination of applicable T&E documentation, establishment of necessary subgroups; managing the corrective action process; supporting the CE process; addressal of substantive T&E issues; briefings by special interest activities (for example, safety, environmental, software, and identification of problems and resolution of issues).

a. For programs with a MS A, the initial meeting should occur immediately following MS A, for the express purpose of developing, coordinating, and obtaining approval of the Test and Evaluation Strategy. For programs moving toward program initiation, the initial T&E WIPT meeting should be held in conjunction with the core staffing review of the draft ORD to familiarize the T&E WIPT members with the preliminary system requirements. The meeting will identify all principal T&E WIPT members, finalize the draft T&E WIPT Charter, and task T&E WIPT members to prepare input for the Test and Evaluation Strategy or initial TEMP, as applicable. For programs approaching program initiation (that is, MS B), this initial meeting may review a strawman TEMP (that is, a preliminary draft TEMP) produced jointly by the core T&E WIPT members (that is, MATDEV, CBTDEV, and system evaluator). The initial meeting can also be used to support the PM in developing the T&E strategy for incorporation into the draft acquisition strategy.

b. Notice of the initial T&E WIPT meeting should be sent at least 14 calendar days (preferably 30 calendar days) prior to the meeting. A draft agenda should accompany the notice. The agenda should be finalized with input solicited from the T&E WIPT members. The notice should also include a copy of the approved DOTMLPF Needs Analysis and, for an ACAT I or IA programs, the approved MNS. For programs preparing for program initiation, the notice should also include the draft ORD and, if available, a draft acquisition strategy.

c. The following actions should be accomplished at the initial T&E WIPT meeting—

(1) Provide a program or system orientation briefing, including a discussion of the draft system acquisition strategy. At the initial meeting, it is likely that attendees will be unfamiliar with the new program and it is necessary to familiarize them with all aspects of the program.

(2) Review available system requirements documents to familiarize members with preliminary system requirements. The CBTDEV should conduct the review. Describe the overall acquisition approach(s) that are being considered (or that will be employed), identifying areas needing the T&E community's input in the early planning of the acquisition strategy to ensure adequate T&E is integrated into the overall program.

(3) Initiate development of the T&E strategy for incorporation into the draft acquisition strategy.

(4) Initiate dialogue to define the critical technical parameters (CTPs) to be addressed in T&E. Review the CBTDEV's plan and status of the COIC and KPP.

(5) Identify existing data, as well as M&S, test, and other data generation requirements for the respective life cycle phases that will support system development and generate data for the system evaluation required for each milestone.

(6) Task T&E WIPT members to draft their respective portions of the TEMP if a strawman is not provided. If a strawman was prepared, T&E WIPT members' comments and recommended changes should be discussed. Agreement should be reached on changes to be made, issues to be resolved, and the corresponding schedule leading to the T&E WIPT members signing the TEMP Coordination Sheet at a future T&E WIPT meeting (commonly referred to as the TEMP "Signing Party").

(7) Draft the T&E WIPT Charter. Ensure all T&E WIPT members (principal and associate) are identified. Define the roles and responsibilities of each T&E WIPT member organization, to include funding responsibilities.

(8) Review available contract documentation. Generally, contractual documentation has not been prepared at this point, however it is important to stress that a major function of the T&E WIPT members is to review contractual documents for T&E adequacy. If there is a draft Statement of Work (SOW) or RFP, it is useful to highlight the contractual requirements for T&E.

(9) Establish required subgroups.

(10) Discuss related document development and status, which affect T&E planning; related document completion is necessary to facilitate the T&E process (for example, COIC, the Safety Assessment Report (SAR), the Security Classification Guide (SCG), Safety Release (SR), environmental documentation, Independent Safety Assessments (ISAs), and System Safety Risk Assessments (SSRAs)).

(11) Establish unique identifiers for the test title and system name for the purpose of initializing a database in the Army Test Incident Reporting System (ATIRS). Determine which tests require Test Incident Reports (see para 6–29) and identify them in the TEMP.

(12) Record the minutes and action items. After the meeting the chairperson will prepare the meeting minutes including the Action Item List (AIL), and distribute as agreed to at the meeting and in the T&E WIPT Charter.

(13) Establish the distribution list for the T&E WIPT minutes containing all pertinent information (for example, actual name of each T&E WIPT member, organizational mailing address, phone and facsimile numbers, and electronic mail (e-mail) address.

(14) Discuss the action items assigned and develop a tentative agenda for the next meeting.

(15) Establish, as a minimum, the following ground rules whenever T&E WIPT industry participation exists:

— At the beginning of each meeting, the T&E WIPT chair will introduce each industry representative, including the representative's affiliation and purpose for attending.
— Chair will inform the T&E WIPT members of the need to restrict discussions while industry representatives are in the room, and/or the chair will request the industry representatives to leave before matters are discussed that are inappropriate for them to hear.

(16) Review training requirements and training development documents to ensure that training and train-up issues of the system evaluator and participants are identified early in the testing process. The TNGDEV should conduct the review.

d. Follow-on T&E WIPT meetings should occur on a timely basis to continue the T&E planning effort and the development, coordination, and approval of the required T&E documentation, especially the TEMP. The progress of the test program will be addressed and subgroups will meet as appropriate. As program changes occur and T&E details are developed, program planning modifications will be required. Discussion of issues should occur continuously and, upon resolution, closed out in the AIL. Ground rules associated with industry participation in the T&E WIPT process must be adhered to. The T&E WIPT members will participate in test readiness reviews (TRRs) to coordinate and resolve T&E issues. Techniques for data collection, incident reporting, and other test peculiar issues should be fully coordinated and integrated within the T&E community. A T&E WIPT can be held at any time when it is necessary to assemble the many organizations involved in the T&E process for the program. Reasons for convening a T&E WIPT meeting include when the program is restructured; when an event presents a serious conflict for the next series of tests; during a test to disseminate information; or when a significant event or change to the program occurs.

2–7. T&E WIPT document review

T&E WIPT members will be afforded a timely opportunity to review and provide input on draft documents so as to ensure accurate T&E documentation. T&E WIPT concurrence is not sought during the T&E WIPT review. Document reviews may identify an issue(s) for the T&E WIPT to attempt resolution and, if not satisfactorily resolved to all concerned, elevated to the IIPT or proper chain of command channels. If necessary, the DUSA(OR) will adjudicate the issue(s). Typical documents reviewed by the T&E WIPT consist of—

— Acquisition Strategy.
— ORD.
— C4ISP.
— COIC.
— AoA Study Plan and/or Report.
— RFP and SOW.
— System Specifications.
— System Threat Assessment Report (STAR).
— System Training Plan (STRAP).
— SEP.
— Test and M&S Event Design Plans (EDPs).

— Outline Test Plans (OTPs).
— Request for waivers.

2–8. Other T&E WIPT considerations

Each of the following areas are considered during the T&E WIPT planning process and are discussed in detail in later chapters of this pamphlet.

a. Multi-Service acquisition programs with Army lead will have the same Army T&E WIPT membership as an Army unique acquisition program. Participating Services will determine their membership requirements to be documented in the T&E WIPT Charter. Multi-Service programs with Army participation (not Army lead) will have, as a minimum, representatives from the PM or MATDEV, CBTDEV or functional proponent, system evaluator, and the DUSA(OR). If any Army unique testing is planned, the appropriate test agency will also be represented. As in all cases, membership is documented in the T&E WIPT Charter. T&E WIPT participation and TEMP development, coordination, and approval processes will adhere to the lead Service procedures.

b. Essential to the T&E WIPT process is the performance of specialized tasks assigned to subordinate working groups (that is, subgroups). The subgroups are necessary to define the details of the T&E program, handle the necessary interfaces with other disciplines not included in the T&E WIPT membership, prepare for testing, and develop supporting T&E documentation. Additionally, the subgroups are required to coordinate and jointly develop T&E needs and identify potential course of action to resolve them. When possible, the T&E WIPT Charter will delineate the planned subgroups. In some cases the subgroups may need to establish their own work groups.

(1) The Reliability, Availability, and Maintainability Working Group (RAM WG), co-chaired by the MATDEV and CBTDEV, will address all RAM T&E issues. The PM, system evaluator, developmental tester, and operational tester, as a minimum, participate on this subgroup. See chapter 5 for more detail.

(2) The Supportability subgroup, chaired by the PM or MATDEV ILS manager, will provide coordination between the T&E WIPT activities and the Supportability IPT. Topics to be coordinated will include all supportability test issues, test requirements, and logistic demonstration requirements contained in the TEMP (AR 700–127). As a minimum, the PM/MATDEV, logistician, and system evaluator participate on this subgroup.

(3) A Modeling and Simulation (M&S) subgroup, chaired by the PM or MATDEV, will determine those data requirements that can be cost effectively satisfied through validated and accredited M&S rather than by DT or OT testing; use M&S to demonstrate RAM requirements; integrate M&S with the T&E program; obtain empirical data to validate M&S; and determine the appropriate use of accredited M&S to support DT, OT, LFT, and system evaluation. As a minimum, the PM/MATDEV, CBTDEV, TNGDEV, system evaluator, and test representatives participate on this subgroup.

(4) The Threat subgroup, chaired by the threat integrator member of the T&E WIPT, reviews, coordinates, and maintains the Threat Test Support Package (TSP). As a minimum, the PM/MATDEV, threat integrator, system evaluator, and test representatives participate on this subgroup.

(5) A Live Fire Test and Evaluation (LFT&E) subgroup, when required, chaired by USATEC, is formed to prepare the LFT&E strategy and input to the TEMP. Membership typically includes the PM or MATDEV, CBTDEV, TNGDEV, DOT&E, DUSA(OR), system evaluator, vulnerability and lethality analysts, testers, the medical community, the intelligence community, and the system contractor (as required).

c. There are many related disciplines and working groups that have close ties with the T&E WIPT. Their activities occur concurrently and are often combined with the activities of the T&E WIPT. The communication lines between them and the T&E WIPT must be clear and allow for the transfer of information to enhance the progression of work for all disciplines. Some of these closely related disciplines and working groups are listed below.

(1) *Test readiness review (TRR).* Testers conduct TRRs at various points leading up to the start of test. MATDEV/PM certifies that the materiel system is ready for test. Threat analyst certifies the threat representation for OT. After coordinating with the doctrine and training developers, the CBTDEV certifies the readiness of doctrine and organization for OT. Trainers certify the readiness of soldiers and units employing new systems for OT. The test unit certifies its readiness for OT. Testers address the readiness of planning, preparation, and test resources for DT and OT. Essential to the TRR process are entrance criteria established in the TEMP. Specific types of TTRs are—

(a) Operational TRR (OTRR). The Operational TRR (OTRR) is the forum to assess aspects of the a system's readiness to enter OT (such as, performance, supportability, training, and doctrine) and the status of planning for and capability to conduct the OT, to include resources and other requirements. Membership includes the PM or MATDEV, operational tester (chair), CBTDEV, training developer/trainer, threat analyst, test unit, logistician, developmental tester, and system evaluator.

(b) Developmental TRR (DTRR). Developmental TRR (DTRR) assesses the system's readiness to enter DT and the status of planning for and capability to conduct the DT, to include resources and other requirements. Membership, as a minimum, includes the PM or MATDEV (chair), developmental tester, and system evaluator.

(2) *Data Authentication Group (DAG).* Either the system evaluator or operational tester determines the need for a Data Authentication Group (DAG). By mutual agreement, either the system evaluator or operational tester chairs the

DAG with representatives from required areas of expertise. (See para 6–50.) The DAG meets while operational tests are being conducted to ensure timely exchange of data among all participating organizations/commands and to build a factual database by assisting in data reduction, data analysis, and the investigation of problems surfaced in test data. The group is formed when the evaluation of systems require complex data collection and instrumentation. Its members may also comprise the membership of the RAM Subgroup who participate in the RAM scoring and assessment IPT. Composition of the DAG for an OT is included in the Outline Test Plan (OTP).

(3) *Computer Resources Working Group.* The Computer Resources Working Group is established by the PM or MATDEV after MS B for each materiel system with embedded software to aid in the management of system computer resources. The Computer Resources Working Group assists in ensuring compliance with policy, procedures, plans, and standards established for computer resources. Membership includes the combat developer, training developer, MATDEV, developmental and operational testers, system evaluator, and the PDSS activities. Members will actively participate in all aspects of the program dealing with computer resources, including software incident reporting and corrective action.

(4) *Supportability IPT.* The Supportability IPT is established to coordinate overall ILS planning and execution. Membership includes the PM or MATDEV, developmental tester, operational tester, system evaluator, logistician, and trainer (see AR 700–127).

(5) *MANPRINT Joint Working Group.* The MANPRINT Joint Working Group develops the System MANPRINT Management Plan and coordinates the MANPRINT program. Membership includes the PM or MATDEV, CBTDEV, TNGDEV, system evaluator, logistician, and the personnel community and other organizations as appropriate (see AR 602–2).

(6) *System Safety Working Group.* The System Safety Working Group is chaired by the PM or MATDEV, and provides program management with system safety expertise and ensures enhanced communication between all IPT members. Membership includes the PM or MATDEV, developmental tester, operational tester, system evaluator, and independent DA level oversight (USASC) (see AR 385–16).

**CHARTER OF THE * XYZ_ *
TEST AND EVALUATION WORKING-LEVEL INTEGRATED PRODUCT TEAM
(T&E WIPT)**

1. PURPOSE: Brief statement identifying the system T&E WIPT that is being established.

Example: To formally charter the * XYZ_ * T&E WIPT, comprised of the command representatives for the agencies listed in paragraph 3, below.

2. SCOPE: To develop and maintain T&E strategy. To plan, budget, resource, execute, and conduct a T&E program.

3. MEMBERSHIP: List organizations providing membership, either principal or associate. Include organizational mailing address, office symbol, electronic message address, and DSN and facsimile telephone numbers to facilitate communication between member organizations.

Example:

a. Principal members of the * XYZ_ * T&E WIPT will be composed of one representative (primary) from each of the following:

	NAME	ORG	PHONE	EMAIL
(1) Program/Project/Product Manager (PM)/MATDEV				
(2) CBTDEV/Functional Proponent				
(3) System evaluator				
(4) Developmental Tester				
(5) Operational Tester				
(6) Logistician				
(7) Survivability/Lethality Analysis Directorate				
(8) Trainer				
(9) Threat Integrator				
(10) HQDA Offices				
(a) ASA(ALT)				
(b) CIO/G-6				
(c) DUSA(OR)				
(d) ASA(ALT) ILS (or DCS,G-4)				
(e) DCS,G-1				
(f) DCS,G-2				
(g) DCS,G-3				
(h) DCS,G-8				
(11) For programs on the OSD T&E Oversight List				
(a) DOT&E				
(b) OUSD(AT&L)DS/DT&E				

b. Associate Members: Provide functional or special knowledge, skills, or expert support to the T&E WIPT. Associate members do not have the coordination privilege as the principal members.

4. OBJECTIVE: Specific objective of each T&E WIPT is listed.

Example: The objective of the * XYZ_ * T&E WIPT is to provide a forum for test planning and integration to ensure an adequate and comprehensive test program to fully validate the system.

5. PROCEDURES: The procedures section provides the broad, general guidelines under which the T&E WIPT will operate. The method of calling meetings, representation by members, developing agenda items, and

Figure 2–2 (PAGE 1). Format of a T&E working-level IPT Charter

conducting meetings are included. The organization of each T&E WIPT member is shown including the interface with other activities (for example, design engineering, simulation, and targets management). Procedures are also provided for handling open agenda items, resolution of problems and preparation of minutes of each T&E WIPT meeting. Maximum use should be made of correspondence and electronic communication (for example, videoconferences, teleconferences, electronic mail, and facsimile) to resolve issues.

Example:

a. After coordination with principal members, the chairperson will convene a meeting and provide for the recording and distribution of minutes of meetings.

b. Not less than two (2) weeks prior to each meeting, the chairperson will provide each member agency with notification of the time, place, and agenda for the proposed meeting.

c. Member agencies will be responsible for ensuring their own representation and such additional supplementary representation as may be indicated by the agenda.

d. Threat, Supportability, M&S, RAM, LFT&E and training subgroups will be established, as required.

e. Members will be responsible for action items related to their functional areas that are specified on an Action Item List (AIL) that is revised by the organizations' representatives at each meeting. Such additions or deletions as recommended by agency representatives attending will be reviewed by the group and an updated AIL will be provided as part of the minutes.

f. The T&E WIPT members will provide inputs and recommendations with regard to modification and revision of the TEMP.

g. Disagreements that cannot be resolved on matters of substance will be elevated from the T&E WIPT to the IIPT. If the IIPT cannot resolve the disagreement(s), the matter will be brought through the chain of command to the attention of the DUSA(OR) for adjudication.

6. DISTRIBUTION: This section includes distribution to be made of the T&E WIPT Charter, changes thereto, minutes of meetings, plans, and reports.

Example:

a. This charter, minutes of all meetings, and all issues of the * **XYZ** _* T&E WIPT AIL will be distributed to each * **XYZ** _* T&E WIPT principal member within ten (10) working days after the meeting.

b. If the minutes do not adequately reflect a member's understanding of what was accomplished at a T&E WIPT meeting, or if a member organization's position changes, this should be brought to the attention of the chairperson for correction or added as an action item to the next T&E WIPT Agenda within two (2) weeks after receipt of the minutes.

c. Additional supplemental distribution of meeting minutes and AIL will be as recommended by the group.

d. Copies of T&E documentation, both government and contractor, will be provided to all T&E WIPT members.

e. Specific points of contact and their addresses are provided as an appendix.

7. Based on concurrence by the principal T&E WIPT members, this charter is approved.

Signature Block/Date	Signature Block/Date
T&E WIPT Chair	PM * **XYZ** _*

Figure 2–2 (PAGE 2). Format of a T&E working-level IPT Charter—Continued

Chapter 3
Test and Evaluation Master Plan (TEMP)

3–1. TEMP procedures

a. This chapter provides procedural guidance for preparing, staffing, and gaining approval of the TEMP. Detailed guidance on format, content, review, and approval procedures to be followed by all Army programs in preparation of the TEMP is also included in this chapter.

b. All acquisition programs are supported by an acquisition strategy (AS) that reflects a comprehensive and efficient T&E program. To accomplish this task, each acquisition program/system will have a single TEMP, except those involving the use of investigational drugs, biologicals, and devices in humans that fall under Parts 50, 56, and 312, Title 21, Code of Federal Regulations. (See AR 73–1, para 10–2*b*(7).)

c. TEMP requirements are summarized below:

(1) The TEMP is the basic planning document for all life cycle T&E related to a particular system acquisition and is used by decision making bodies in planning, reviewing, and approving T&E activities. The TEMP documents T&E planning and requires executive level approval before proceeding to program initiation and subsequent MS and the FRP decision review. The approved TEMP is the overarching T&E document used by the T&E community to generate detailed T&E plans and to ascertain schedule and resource requirements associated with the T&E program. Since the TEMP charts the T&E course of action during the system acquisition process, all testing, data generation/gathering, and other evaluation events/activities planned that impact on program decisions are outlined.

(2) The TEMP is a living document that summarizes program schedule, test management strategy and structure, and required resources to address and assess the adequacy to achieve the requirements stated in the—

— COIC, to include KPPs and other operational requirements (that is, threshold and objective levels from the ORD).
— CTPs.
— Evaluation requirements (for example, MOE, MOS, MOP, and criteria, when applicable).
— Major decision points.

(3) An approved Army TEMP is required before an Outline Test Plan (OTP) for a test supporting system acquisition can be included in the Five-Year Test Program (FYTP).

(4) The TEMP addresses the T&E to be accomplished in each planned program phase. The TEMP can jointly address DT & OT in a consolidated Part III–Integrated Test and Evaluation.

(5) The body of a TEMP should be reflective of the amount of testing required and complexity of the program. Being a management plan, the target size of a TEMP should be approximately 30 pages, including pages for figures, tables, matrices, and so forth. Although annexes and attachments are excluded from the 30-page limit, their size should be kept to a minimum. The TEMP must provide a clear and adequate definition of the system's T&E strategy and requirements being addressed to constitute agreement on key elements for resourcing and execution.

(6) Classified TEMPs must be clearly marked as to the classification level and those submitted for HQDA and/or OSD approval must contain all classified data and attachments. A draft TEMP forwarded electronically for review must be done with any classified information omitted, with the classified information sent via secure means (see AR 380–5).

(7) A capstone TEMP is required when a program consists of a collection of individual systems, either as a family-of-systems or as a system-of-systems with requirements stated in a Capstone Requirements Document (CRD). A capstone TEMP integrates the T&E program planned for the entire family or system-of-systems. When appropriate, an annex to the basic capstone TEMP will address individual system-unique content requirements. The need for a capstone TEMP depends upon the degree of integration and interoperability required to satisfy the total system's interoperability KPP, associated information exchange requirements (IERs), and other appropriate operational performance parameters (for example, Joint Technical Architecture (JTA) compliance). The body of a capstone TEMP should be approximately 30 pages, including pages for figures, tables, matrices, and so forth. Each individual system TEMP will be a complete stand-alone document that is annexed to the capstone TEMP.

d. The TEMP is prepared by the MATDEV with support of and in coordination with the other core and principal T&E WIPT members and submitted to the appropriate TEMP approval authority. The initial TEMP is required for program initiation, normally MS B, and is updated, as a minimum, at MS C and the FRP Decision Review for the initial acquisition or increment. TEMP updates reflect planning for each increment under evolutionary acquisition and require approval prior to decision reviews authorizing execution of each increment as well as updates at MS and FRP decision reviews for each increment upgrade. The TEMP focuses on the overall structure, major elements, and objectives of the T&E program and is consistent with the acquisition strategy, approved ORD, and other program documentation (for example, C4ISP). An Army TEMP 101 Brief, developed in coordination with the T&E Managers Committee (TEMAC), is maintained by TEMA and is located at www.hqda.army.mil/tema. The TEMP Checklist, appendix B to this pamphlet, may be used as a guide for TEMP development, review, and staffing.

3–2. TEMP considerations

a. The TEMP must include at least one critical technical parameter and one operational effectiveness issue for the

evaluation of interoperability, to include both intra-Army interoperability certification by the Central Technical Support Facility (CTSF) and joint interoperability certification by the JITC. The TEMP should reference and extract requirements from the appropriate MNS, CRD, ORD, C4ISP, and integrated architectures. The Joint Staff, or HQDA (DCS, G–8) in the case of Army-only materiel and tactical C4I/IT programs, will ensure that all MNS, CRD, and ORD contain specific, testable, and measurable interoperability requirements by coordination with and involvement of appropriate T&E organizations in the requirement generation and approval process. The Joint Staff, USD(AT&L), and ASD(C3I)/DOD CIO, or the HQDA (CIO/G–6) in the case of Army-only non-tactical C4/IT programs, will ensure that the C4ISP and integrated architectures reflect the appropriate family-of-systems context to support the system's interoperability requirements. The system evaluator and testers, in coordination with the MATDEV, CBTDEV (or FP for non-tactical C4/IT programs), TNGDEV, and HQDA (CIO/G–6), should develop the test procedures and effectiveness measures based on the requirements and expected concepts of operations for the systems. Both developmental and operational test plans should specify interoperability test concepts. If not a part of the COIC, the system evaluator for Army programs may include the effectiveness measures in its additional issues for evaluation through the SEP and test/event design plans.

b. Early T&E activities will associate measures of effectiveness (MOE), measures of suitability (MOS), measures of performance (MOP), risks with the needs depicted in the MNS, and with the objectives and thresholds addressed in the AoA. Thresholds are defined in the ORD and APB as these documents become available. Criteria, quantitative when possible, will determine hardware, software, life cycle test facility base infrastructure (to include hardware-in-the-loop (HWIL) and training system requirements), and system maturity and readiness to proceed through the acquisition process. The various approved KPPs and the MOE/MOS used in the AoA and during T&E will remain linked. This linkage is depicted in the TEMP, Attachment 1—Requirements/Test Crosswalk Matrix. Operational scenarios and conditions must also remain linked in order to compare results. AoA and T&E operations must remain linked to provide data for the VV&A of models and simulations, provide for model-test-model applications, and otherwise foster exchange of system data between analyst, tester, and evaluator to promote understanding of a system's effectiveness, suitability, and survivability.

3–3. TEMP requirements

a. TEMP format considerations include—

(1) Army TEMP policy requires that the Defense Acquisition Guidebook format be followed. Within this format, the level of detail is unique for each program. Tailoring of TEMP contents within this format is encouraged. The level of TEMP detail is directly related to the proposed T&E strategy; complexity of the T&E effort needed to verify attainment of technical performance; technical specifications, objectives, safety, and supportability; and to support the evaluation/assessment of the operational effectiveness, suitability, and survivability of the system. The content guidance contained in the following sections is intended to assist the T&E WIPT and the TEMP approval authority in developing a TEMP that reflects an adequate and efficient T&E program.

(2) Appendix C provides various TEMP Approval Page formats to be used.

(3) For TEMPs not requiring HQDA or OSD approval (generally ACAT III programs), additional tailoring is authorized. Although the general format in the Defense Acquisition Guidebook is to be followed, tailoring is allowed to reduce development effort and minimize the size of the TEMP. For example, the following tailoring is permitted—

— Part I, System Introduction, paragraph d, Measures of Effectiveness and Suitability. It is sufficient to reference the ORD.
— Part II, Integrated Test Program Summary. See appendix D, figure D–1 (this summary does not have to be rigidly followed). A program schedule can be used as long as test, data collection/gathering, and other evaluation activities/events are identified. Funding information should be as complete as possible. T&E WIPT member responsibilities do not have to be described in detail. Referencing the charter is sufficient.
— Parts III and IV may be consolidated into a single section titled "Integrated Test and Evaluation." This does not just apply to ACAT III programs when DT and OT are combined.
— Part IV, Operational Test and Evaluation Outline and Live Fire Test and Evaluation Paragraphs. Most ACAT III programs are not required to execute a formal live fire T&E program unless they meet the definition of a covered system or major munitions program as defined in 10 USC 2366. Live fire tests are those tests conducted to gain insight into warhead/target terminal effects (for example, lethality/vulnerability given a hit) and should not be confused with live munitions or missile firings conducted during other DT and OT events (for example, hit probability, or reliability).

b. TEMP development input is appropriate T&E information necessary to ensure the COIC, ORD, CTP, and previous identified deficiencies and requirements are being addressed or have been satisfied. Input is generally provided by the T&E WIPT. See chapter 2, above, for T&E WIPT composition, roles, and functions. Other Government and contractor activities may also provide input to the TEMP, when appropriate. Comments are integrated in the TEMP by the PM, who has primary responsibility for TEMP preparation, staffing, and update in coordination with

other core T&E WIPT members. The MATDEV develops a TEMP Coordination Sheet, with the signature blocks of all principal T&E WIPT members. The Coordination Sheet accompanies the TEMP when forwarded for TEMP approval.

c. A strawman TEMP can be prepared by the PM supported by the core T&E WIPT members for review, discussion, and consideration at the initial T&E WIPT meeting to facilitate T&E strategy discussions and the development of the initial TEMP. The strawman TEMP should be provided to the T&E WIPT members not later than 15 days prior to the initial T&E WIPT meeting. A strawman TEMP will not be cause to limit consideration of principal member proposed alternatives.

d. An initial TEMP is submitted and approved to support program initiation. Since not all information may be available, the initial TEMP should so note the missing information and identify the date when the information will become available

e. TEMPs requiring Headquarters, Department of Army (HQDA) approval include—

(1) Programs on the OSD T&E Oversight List, which is jointly published annually, by the DOT&E and the Director, Defense Systems, Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics) OUSD(AT&L) in consultation with the T&E executives of the cognizant DOD components. These programs require OSD TEMP approval and forwarding of other T&E documentation to OSD. For programs initially designated on the OSD T&E Oversight List, an Army approved TEMP is due to OSD within 90 days of the initial designation.

(2) A TEMP submitted for HQDA or OSD will comply with the milestone documentation submission schedule. The Defense Acquisition Guidebook encourages programs subject to Defense Acquisition Board (DAB) review to submit the TEMP to OSD 30 days prior to the DAB committee review. Programs on the OSD T&E Oversight List that are subject only to internal Army Systems Acquisition Review Council (ASARC), that is, ACAT IC and II must submit the TEMP to OSD 30 days prior to the MS review. If the various HQDA offices have not been included in the initial T&E WIPT and TEMP staffing processes, an additional 20 days are needed for HQDA review and DUSA(OR) approval prior to gaining HQDA TEMP approval. Programs subject to Missile Defense Agency coordination and approval require an additional 14 days for Missile Defense Agency staffing after DUSA(OR) concurrence and prior to submission to OSD.

f. A TEMP is updated prior to Milestone C and the FRP decision review (as required in DODI 5000.2), when the acquisition program baseline has been breached, when the associated ORD or C4ISP has been significantly modified, or on other occasions when the program has changed significantly. Evolutionary acquisition programs may require additional updates to ensure that the TEMP reflects the currently defined program. When a baseline breach occurs, the TEMP will be updated within 120 days of the date of the PM's Program Deviation Report. When a program changes significantly, the TEMP due date will be negotiated between the PM, TEMA, and the DUSA(OR). In the case of programs on the OSD T&E Oversight List, the negotiations will take place between the PM, DUSA(OR), TEMA, DOT&E, and DD, DT&E/DS/OUSD(AT&L).

(1) There are three forms a TEMP update can take:

— Page Changes. Page changes are the preferred approach, when appropriate, because they reduce the effort to review the TEMP, resulting in a speedier review and approval process. Page changes will be submitted as either hardcopy remove and replace changed pages to a standing version of a TEMP or as a file that uses word processing change markings so as not to affect the integrity of the basic document. When page changes are used, each changed page will footnote the current date and change. A signed Coordination Sheet and Approval Page must accompany page changes more detailed than an editorial correction to sentences, and other similarly minor instances.
— Revisions (Rewrites). A TEMP revision is required to address comments received during the review and approval process subsequent to T&E WIPT coordination. TEMPs for ACAT III programs are not subject to the procedures for revision unless they are on the OSD T&E Oversight List and/or when senior management's objections reverse the T&E WIPT coordination. Changes to a TEMP are annotated by change bars in the outside margin. A brief synopsis of how issues and comments were addressed and/or why specific changes were made will accompany the revision. Each changed page will footnote the revision number and current date. For all revisions, T&E WIPT members will be provided a copy of the changes for comment or concurrence to ensure changes are acceptable.
— "No Change" Memorandum. The no change memorandum, when used for ACAT I, II, and other programs on the OSD T&E Oversight List as well as Army and OSD MAIS programs, is prepared by the PM, fully coordinated, and forwarded to TEMA for DUSA(OR) approval and subsequent forwarding to OSD, as appropriate.

(2) Coordination and Approval of TEMP Updates. Regardless of the TEMP update form, it requires a completed coordination and approval process. Coordination with the T&E WIPT members is recorded by executing a T&E WIPT Coordination Sheet. T&E WIPT coordination signatures assist in expediting the TEMP approval process as well as to recognize the key participants in the TEMP development process. If not obtainable at the T&E WIPT "signing party," signatures can be obtained via facsimile or through a scanned PDF file on separate pages for retention by the T&E WIPT chair.

— A new TEMP Approval Page will be executed by the PM, PEO (or developing agency), HQ TRADOC (or functional proponent for non-tactical C4/IT systems) and HQ ATEC for all revisions resulting for HQDA and OSD approval.

— The update will be forwarded by memorandum to TEMA for HQDA review and DUSA(OR) approval and forwarding by TEMA to OSD, as necessary. The memorandum will record that T&E WIPT member coordination was obtained and will enclose the properly executed TEMP Approval Page.

g. Documents that should accompany a TEMP when submitted for HQDA approval include—

(1) A copy of the approved MNS or ORD and validated STAR should be forwarded electronically with the TEMP, unless previously distributed. Classified documents will be sent via the Secret Internet Protocol Router Network (SIPRNET) system or by classified regular mail, not electronically on unclassified machines.

(2) In case of a TEMP update, if support documentation is final and has not changed since the last TEMP approval, a statement will accompany the TEMP attesting to that fact; copies of the documents need not be forwarded. The statement should cite the date, version and/or change number for the most current documents.

h. All documents referenced in the TEMP must be available for submission to HQDA or OSD on request.

i. The request for delay in submitting a TEMP is prepared by the PM. The request for delay will be forwarded to TEMA for forwarding to OSD and DUSA(OR) approval, as necessary. For programs requiring the Missile Defense Agency approval, TEMA will submit a request for delay to the Missile Defense Agency for approval or to OSD if OSD approval is required. In all cases, the reason for the delay must be clearly explained. Delays for administrative reasons are generally not accepted.

j. At the PM's discretion, copies of the approved TEMP can be distributed. If bound, a TEMP must allow for easy insertion of page changes; spiral binding, square, or glue bindings are discouraged. TEMPs submitted for HQDA and OSD approval must contain all classified data and annexes/attachments.

k. When system development is complete and COIC are satisfactorily met or resolved, including the verification of deficiency corrections, a TEMP update is no longer required. Specifically, for programs—

(1) *OSD T&E Oversight.* A request to delete the program from the OSD T&E Oversight List should be prepared by the PM/MATDEV and forwarded through the PEO (or developing agency if not a PEO managed program) to TEMA for forwarding to the DD,DT&E/DS for OSD review and approval. For Missile Defense Agency programs, the request will be sent to the Missile Defense Agency Acquisition Executive by TEMA for forwarding to OSD for approval. The request must be coordinated with HQ TRADOC and HQ ATEC (or SMDC) before forwarding to TEMA.

(2) *Non-OSD T&E Oversight.* A request to defer further updates should be prepared by the MATDEV, coordinated with the T&E WIPT and approved by the TEMP approval authority. Approval should be made a matter of record.

l. Programs possessing the following attributes may no longer require a TEMP update—

(1) A fully deployed system with no operationally significant product improvements or increments remaining.

(2) Full-rate production ongoing, fielding initiated with no significant deficiencies observed in production qualification/verification test results.

(3) A partially fielded system in early production phase having successfully accomplished all DT and OT objectives.

(4) Programs for which planned T&E is only a part of routine aging and surveillance testing, service life monitoring, or tactics development.

(5) Programs for which no further OT or live fire test (LFT) is required by the Army, Joint Chiefs of Staff (JCS), or OSD.

(6) Programs for which future testing (for example, product improvements or increments) has been incorporated in a separate TEMP.

m. Development of the TEMP begins with the establishment and chartering of the T&E WIPT by the PM. The T&E WIPT Charter will identify the role and responsibilities of all agencies participating in T&E. See AR 73–1 and figure 2–2, above, for a sample format T&E WIPT Charter.

3–4. Principal TEMP responsibilities

The PM, or in some cases the MATDEV, has the overall responsibility to produce the TEMP. The ideal method to develop a TEMP is for concurrent TEMP development by the PM, and core T&E WIPT members (that is, PM T&E Lead, CBTDEV/FP, and system evaluator). Input from the other T&E WIPT members comes during the review cycle when the TEMP is staffed for coordination. The responsibilities to maintain TEMP interface between principal T&E WIPT members by TEMP paragraph are shown in table 3–1.

a. PM. Primary TEMP author: Part I, System Introduction, Part II, Integrated Test Program Summary, Part III, Developmental Test and Evaluation Outline (documenting tests that provide information directly to the PM, for example, contractor tests) and Part V, T&E Resource Summary.

b. CBTDEV/TNGDEV/FP. Provide Part I, System Introduction—Mission Description and Measures of Effectiveness and Suitability; Part IV, Operational Test and Evaluation Outline—Critical Operational Issues and Criteria; and input to Part V, T&E Resource Summary and Manpower/Personnel Training. Provide inputs on force development test or experimentation (FDT/E), Concept Experimentation Program (CEP), and Battle Lab experimentation for inclusion in Parts II and IV as necessary.

c. Evaluator and Testers. Provide input to: Part II, Integrated Test Program Summary and Part III, Developmental Test and Evaluation Outline; provide Part IV, Operational Test and Evaluation Outline and primary input to Part V, T&E Resource Summary.

d. Threat Integrator (TI). Provide input to Part I, System Introduction, System Threat Assessment.

Table 3–1
TEMP preparation responsibility matrix

TEMP part and section	PM	CD/FP	TI	T&E Activity	Logistics
Part I. System Introduction					
a. Mission Description	S	P			
b. System Description	P	S			
c. System Threat Assessment	S		P	S	
d. Measures of Effectiveness and Suitability	S	P		S	S
e. Critical Technical Parameters	P	S		S	S
Part II. Integrated Test Program Summary					
a. Integrated Test Program Schedule	P	S		S	S
b. Management	P	S		S	S
Part III. Developmental Test and Evaluation Outline					
a. Developmental Test and Evaluation Overview	P			S	S
b. Future Developmental Test and Evaluation	P			S	S
Part IV. Operational Test and Evaluation Outline					
a. Operational Test and Evaluation Overview	S			P	S
b. Critical Operational Issues and Criteria	S	P		S	
c. Future Operational Test and Evaluation	S	S		P	S
d. Live Fire Test and Evaluation	S			P	
Part V. Test and Evaluation Resource Summary					
a. Test Articles	S			P	S
b. Test Sites and Instrumentation	P	S		P	S
c. Test Support Equipment	S		S	P	S
d. Threat Representation	S		S	P	
e. Test Targets and Expendables	P		S	P	

Table 3–1
TEMP preparation responsibility matrix—Continued

TEMP part and section	PM	CD/FP	TI	T&E Activity	Logistics
f. Operational Force Test Support			S	P	
g. Simulations, Models and Testbeds	P	S		P	
h. Special Requirements	S			P	
i. T&E Funding Requirements	P			P	
j. Manpower / Personnel Training		P		P	S
Annex A Bibliography	P	S	S	S	S
Annex B Acronyms	P	S	S	S	S
Annex C Points of Contact	P	S	S	S	S
Attachment 1: Requirements/Test Crosswalk Matrix	P	S		S	
Other Annexes/Attachments	P				

P: Principal Responsibility; PM: Program Manager; LOG: Logistician; TI: Threat Integrator; S: Support Responsibility; CD/FP: Combat Developer/ Functional Proponent

3–5. TEMP review and approval process

a. General review and approval procedures involve—

(1) *Review and concurrence.* Upon development and coordination with the T&E WIPT members (see fig 3–1), the TEMP is submitted for principal signatory review and concurrence. This review and approval process varies depending on TEMP approval authority. Changes required to the TEMP as a result of review must be restaffed with the T&E WIPT and other principal signatories. Re-staffing time is to be held to a minimum, that is, no more than 15 calendar days. The TEMP checklist provided as appendix B to this pamphlet may be used as a guide during the TEMP review and approval process.

(2) *Empowerment for approval page.* T&E WIPT members representing organizations included on the Approval Page are encouraged to attend the final T&E WIPT empowered to sign the Approval Page for their organization. This requires the representative to have staffed the document throughout his/her organization and received authorization from the signature authority to sign the TEMP. Doing so dramatically decreases the TEMP staffing time and negates potential submission delays to HQDA and/or OSD.

b. TEMP staffing for OSD T&E oversight materiel and tactical C4I/IT programs (ACAT I–III). (See fig 3–2.)

(1) The PM signs in the "submitted by" signature block on the Approval Page and forwards the TEMP concurrently to the PEO (developing agency, if not under PEO structure), HQ TRADOC, and ATEC (or their designees) for concurrence. The PM then forwards the fully signed TEMP to TEMA for HQDA staffing (if not incorporated in the T&E WIPT process as described in chapter 2, above) and approval by the DUSA(OR). This concurrence and approval process should take no more than 30 calendar days.

(2) Upon Army approval, TEMA forwards the TEMP by transmittal memorandum to the DD, DT&E/DS for OSD review and approval.

(3) A TEMP is approved when signed by the DOT&E and D, DS. The OSD goal is to provide formal approval or comments for TEMP modifications within 30 calendar days after receipt.

(4) The OSD approval memorandum and signed TEMP Approval Page (see app C, fig C–1) are forwarded by TEMA to the PM for inclusion in the TEMP and is attached to the front cover.

c. TEMP staffing for Missile Defense Agency programs (see fig 3–3).

(1) After the T&E WIPT chair provides a fully coordinated TEMP to the PM, the PM signs in the "submitted by" signature block of the Approval Page and forwards the TEMP concurrently to the PEO Air and Missile Defense (AMD), HQ TRADOC, and HQ ATEC for concurrence. The PM forwards the fully coordinated and signed TEMP to TEMA for HQDA staffing (if necessary) and concurrence by the DUSA(OR). Upon Army concurrence, TEMA forwards the TEMP to the Missile Defense Agency Program Integrator (PI). This concurrence process should be accomplished within 30 calendar days.

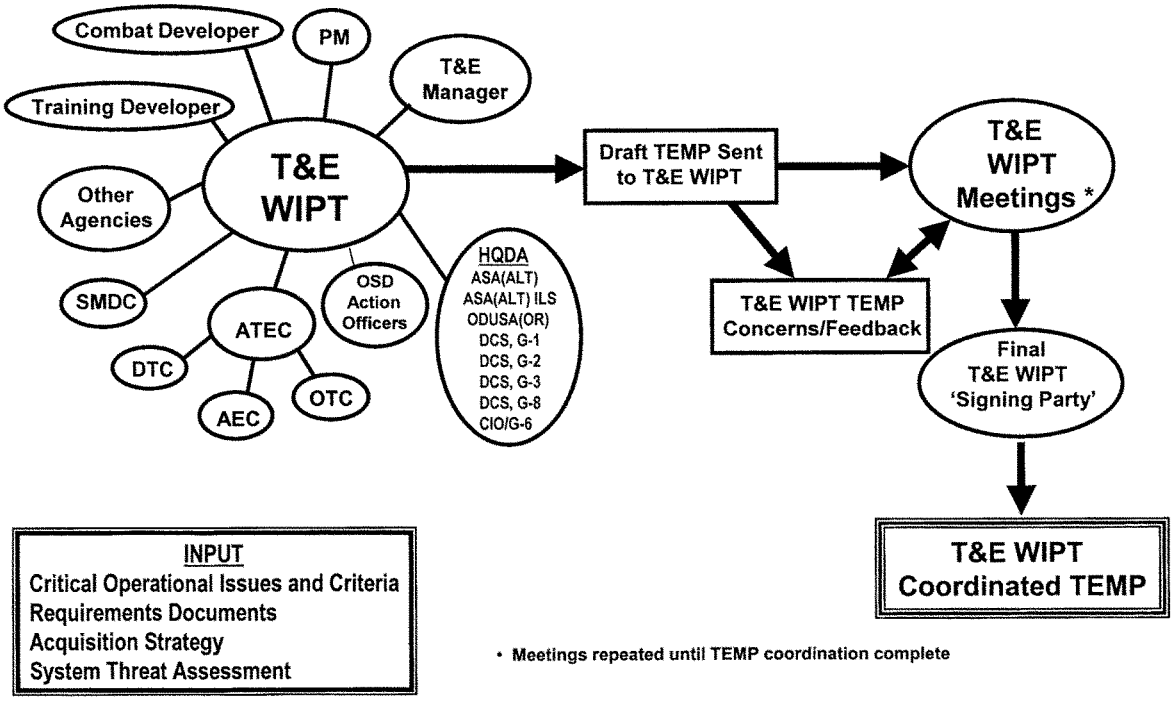


Figure 3–1. TEMP development and T&E WIPT coordination process

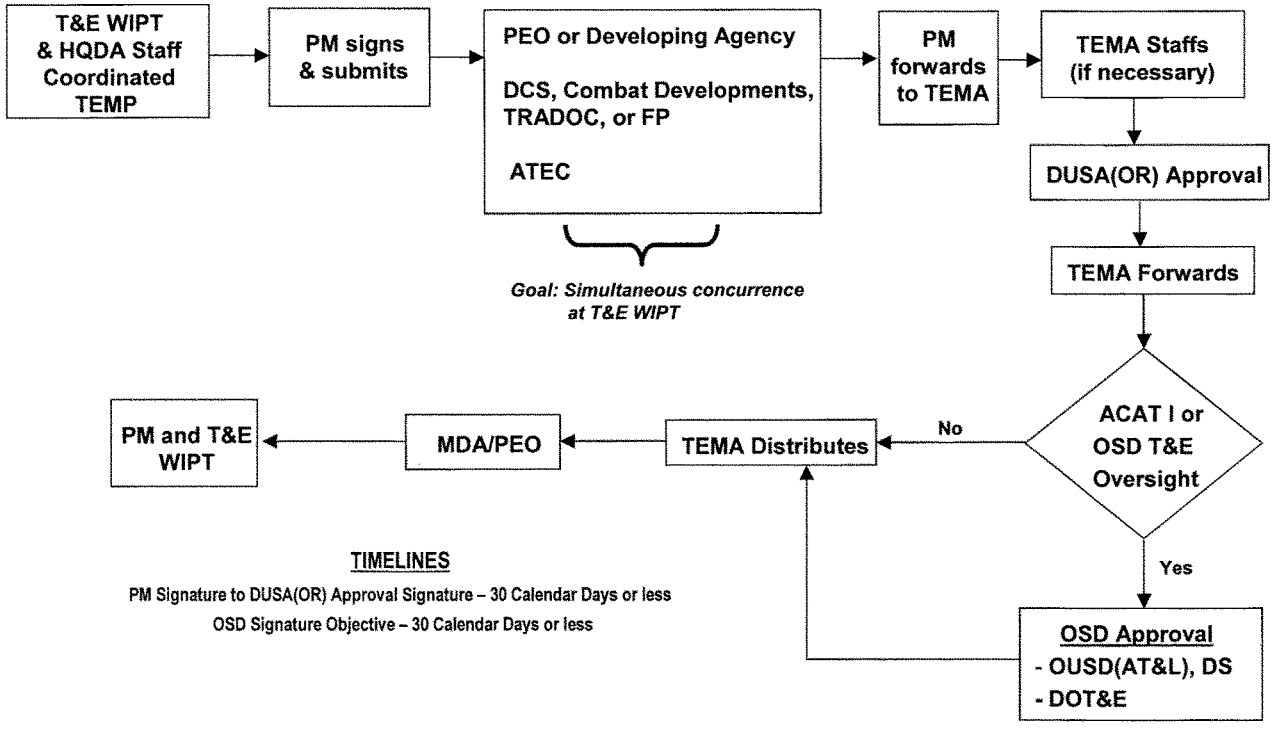


Figure 3–2. TEMP staffing for OSD T&E oversight programs

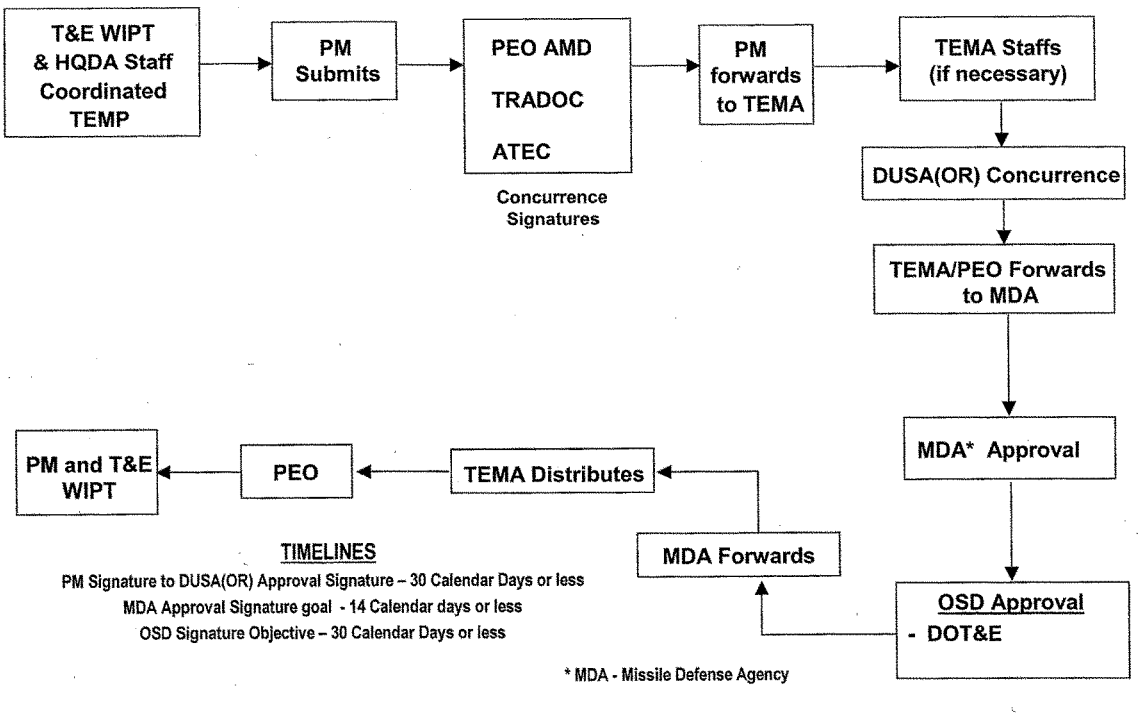


Figure 3–3. TEMP staffing for Missile Defense Agency programs

(2) The PI, through the Missile Defense Agency T&E Directorate, obtains Missile Defense Agency review and approval. This coordination process should take no more than 14 calendar days.

(3) Upon Missile Defense Agency approval, the Missile Defense Agency PI forwards the TEMP to the DOT&E for OSD review and approval.

(4) The TEMP is approved when signed by the DOT&E. The OSD goal is to provide formal approval or comments for TEMP modifications within 30 calendar days from receipt. (See app C, fig C–2.)

(5) The OSD approval memorandum and signed TEMP Approval Page are forwarded to the Missile Defense Agency PI for inclusion in the TEMP for final distribution. The total staffing process, from PM submission until OSD approval, should not exceed 74 calendar days.

d. TEMP staffing for multi-Service OSD T&E oversight materiel and tactical C4I/IT programs—Army Lead (ACAT I–III) (see fig 3–4). Same as detailed in paragraph 3–5*b*, above, except—

(1) After the T&E WIPT chair provides a fully coordinated TEMP to the PM, the PM or developing agency forwards the TEMP concurrently to the PEO, HQ TRADOC, ATEC and the participating Service operational test agencies (OTAs) and participating Service PEO or developing agency and user's representative for concurrence. This concurrence process should take no more than 20 calendar days and supplements the coordination accomplished at the T&E WIPT level.

(2) The PM provides a copy of the fully coordinated and concurred TEMP to TEMA for forwarding to the other Services' TEMP approval authorities for their component approval. A copy of the MNS, STAR, and ORD, or a statement of currency if documents were previously submitted and are still current should be sent as needed. Upon other Services' component approvals, the TEMP is delivered to TEMA for approval by the DUSA(OR). This process should not exceed 10 calendar days. TEMA forwards the Army approved TEMP to DD, DT&E/DS for OSD review and approval.

(3) If the multi-Service program is not on the OSD T&E Oversight List, the PM forwards the TEMP to the Army MDA for approval. Upon MDA approval, the PM distributes the TEMP. The total process should not exceed 60 calendar days.

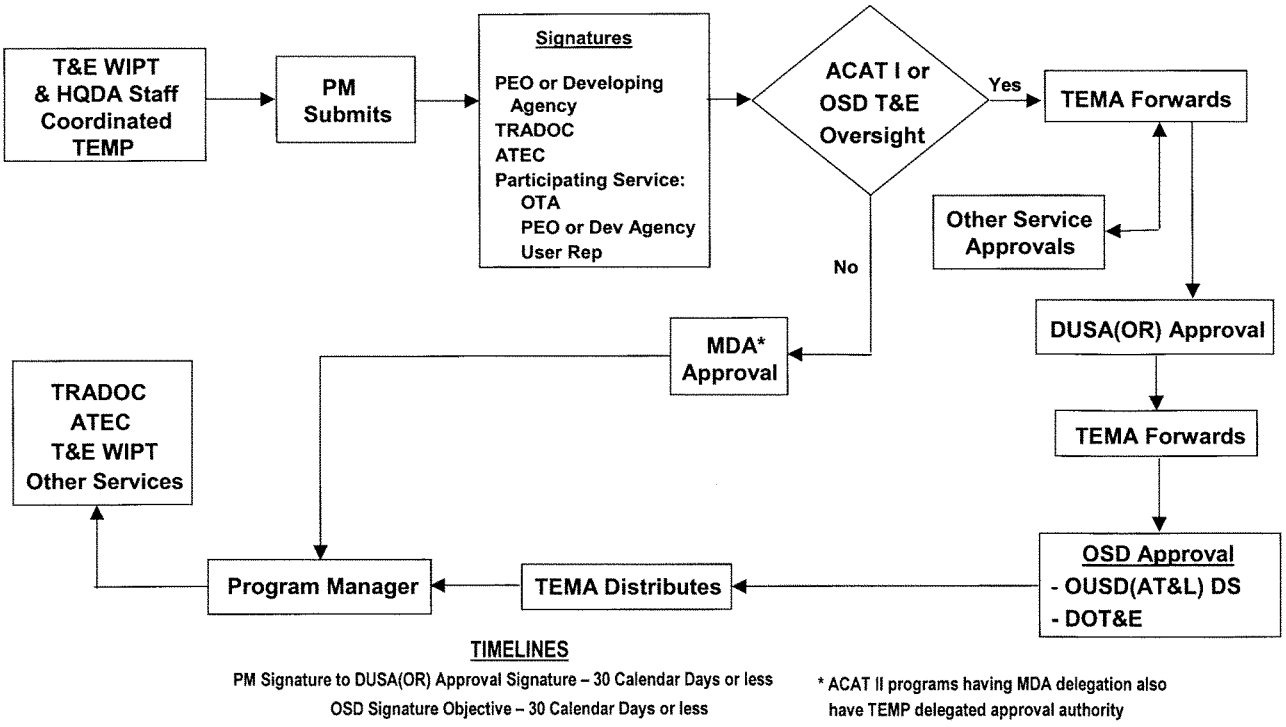


Figure 3–4. TEMP staffing for multi-Service OSD T&E oversight programs—Army Lead

(4) The Approval Page format is shown at appendix C, figure C–3. If there is more than one participating Service or agency, a separate Approval Page for each Service/agency should be prepared. The Approval Page should include the concurrence signature block for each Service/Agency PEO, User Representative, the OTA, and the Service/Agency TEMP approval authority. Both the U.S. Air Force and the U.S. Navy have two TEMP approval authorities. For the Air Force, the Assistant Secretary of the Air Force (Acquisition) and the Director, Air Force Test and Evaluation, HQ USAF approve the TEMP. For the Navy, the Assistant Secretary of the Navy (Research, Development, and Acquisition) and the Director, Test and Evaluation and Technology Requirements, Office of the Chief of Naval Operations, approve the TEMP.

(5) As necessary, TEMP information to support Joint Requirements Oversight Council will be made available per CJCSI 3170.01.

e. TEMP staffing for multi-Service OSD T&E oversight materiel and tactical C4I/IT programs—Army Participant. (See fig 3–5.)

(1) The TEMP is prepared according to Lead Service/Agency procedures. Army unique COIC are to be provided for inclusion as an annex to the TEMP.

(2) The Lead Service PM forwards the T&E WIPT (or equivalent) coordinated TEMP to the Lead Service PEO for concurrence. The Lead Service PEO sends the TEMP to the Army PEO or developing agency for signature and to secure HQ ATEC and HQ TRADOC concurrence on the Approval Page. For those multi-Service programs where a separate Army T&E WIPT is convened and TEMP coordination is documented on a T&E WIPT Coordination Sheet, the responsible Army PEO or PM should forward the T&E WIPT concurrence to TEMA to support HQDA review (if necessary) and approval by the DUSA(OR).

(3) The Lead Service provides the TEMP to TEMA for HQDA staffing and approval by the DUSA(OR). This coordination process is to be accomplished within 20 calendar days.

(4) The Army approved TEMP is returned by TEMA to the Lead Service (see app C, fig C–3).

(5) The Lead Service acquisition executive forwards the TEMP to the DD, DT&E/DS for OSD review and approval.

(6) The OSD approved TEMP is distributed by the Lead Service PEO. Each participating Service receives a copy of the OSD TEMP approval memorandum. The total process time should not exceed 50 calendar days.

(7) As necessary, TEMP information to support Joint Requirements Oversight Council will be made available per CJCSI 3170.01.

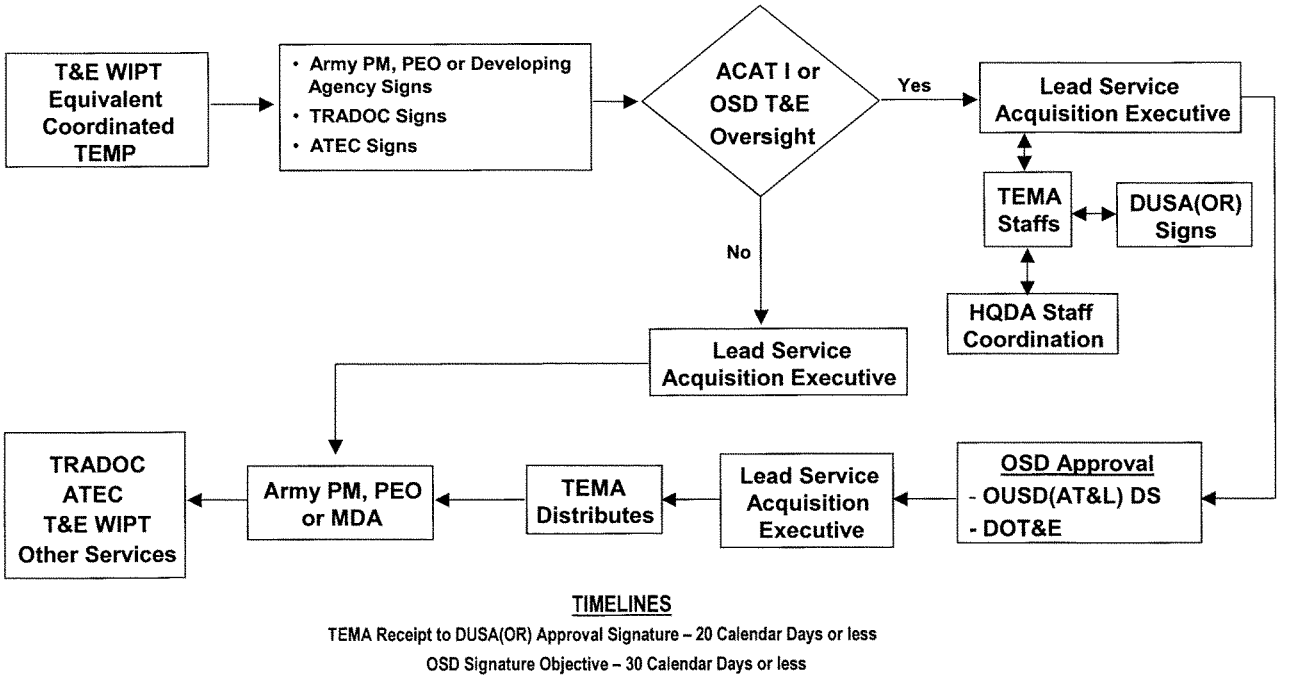


Figure 3–5. TEMP staffing for multi-Service OSD T&E oversight programs—Army Participant

f. TEMP staffing for ACAT II and Army special interest programs, non-OSD T&E oversight.

(1) After the T&E WIPT chair provides a fully coordinated TEMP to the PM, the PM signs in the "submitted by" signature block on the Approval Page and forwards the TEMP concurrently to the PEO (developing agency, if not under PEO structure), HQ TRADOC, and HQ ATEC for concurrence. If the AAE delegates the MDA to a PEO, then the PM forwards the TEMP to the delegated MDA for approval. If the AAE retains authority over the program, then the PM forwards the signed TEMP to TEMA for HQDA staffing and approval by the DUSA(OR). This process should take no more than 30 calendar days.

(2) The Army approved TEMP is returned to the PM for distribution.

(3) This process is reflected at figure 3–2, when AAE is MDA, and figure 3–6, when MDA is delegated to a PEO.

(4) The Approval Page format is shown in appendix C, figures C–1 or C–4.

g. TEMP staffing for multi-Service non-OSD T&E oversight ACAT II programs for Army-Lead and MDA is the Army Acquisition Executive.

(1) After the T&E WIPT chair provides a fully coordinated TEMP to the PM, the PM signs in the "submitted by" signature block on the Approval Page and forwards the TEMP concurrently to the PEO (developing agency, if not under PEO structure), HQ TRADOC, HQ ATEC, and the participating Service OTAs, participating Service PEOs, or developing agencies and user's representatives for concurrence. This coordination process should take no more than 20 calendar days and supplements the coordination accomplished at the T&E WIPT level.

(2) The PM provides a copy, to include one for each participating Service, of the signed TEMP to TEMA for HQDA staffing and other Service approval. The TEMP is then submitted for approval by the DUSA(OR).

(3) The DUSA(OR) approved TEMP is returned by TEMA to the PM for distribution.

(4) This process is reflected at figure 3–6 when the MDA is retained by the AAE.

(5) The Approval Page format is shown in appendix C, figure C–5.

h. TEMP staffing for non-OSD T&E oversight ACAT III (to include multi-Service) and Army special interest programs. (See fig 3–6.)

(1) T&E WIPT members should staff the TEMP within their organization to ensure complete review and concurrence during the initial 30 calendar day TEMP review period. Substantive issues should be surfaced and resolved at the T&E WIPT. T&E WIPT member coordination constitutes organization concurrence.

(2) Approval is held in abeyance pending T&E WIPT member senior management review. The review period for ACAT III programs is 20 working days after concurrence by an organization's T&E WIPT member. On expiration of the review period, the TEMP approval authority signs the TEMP as approved and executable, provided no objections are received from T&E WIPT organizations. The TEMP approval authority is the MDA.

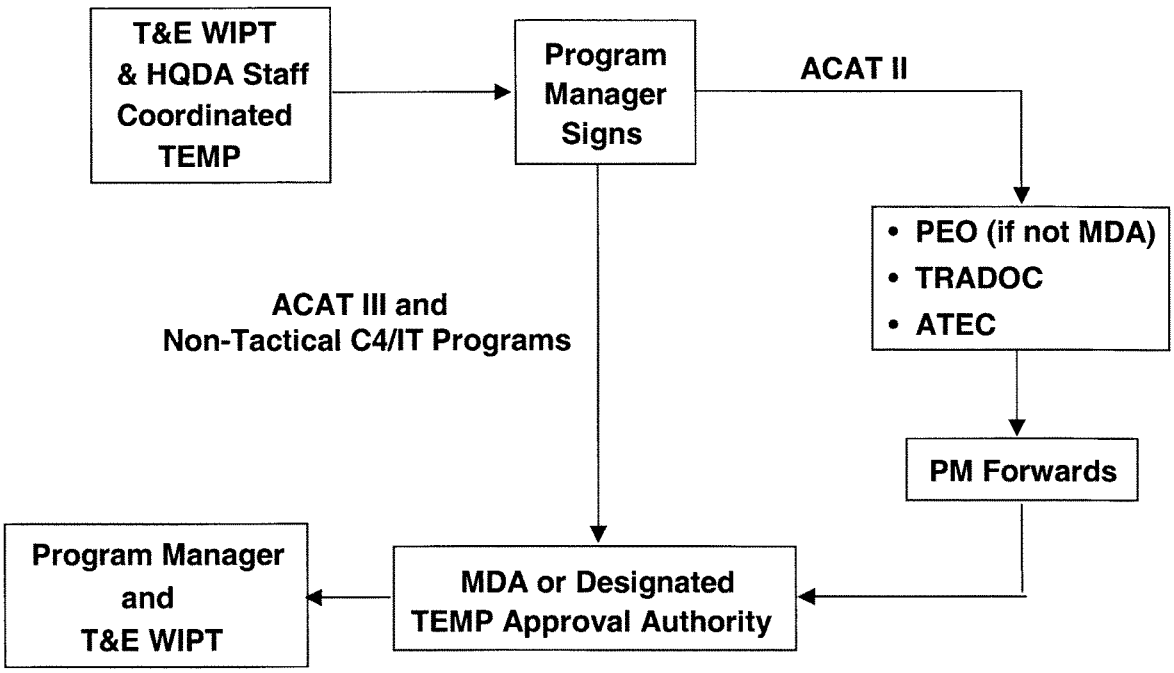


Figure 3–6. TEMP staffing for non-OSD T&E oversight ACAT II, ACAT III, and Army special interest programs

(3) T&E WIPT member organizations can reverse their concurrence within the designated review period by providing written notice of nonconcurrence signed by senior management. The notice is to be sent to the PM.

(4) The Approval Page format is shown in appendix C, figure C–6.

i. TEMP staffing for non-tactical C4/IT and space programs.

(1) The same TEMP staffing and approval process is followed as detailed in paragraphs 3–5*b* through 3–5*h* above (except para 3–5*c*).

(2) The Approval Page format is similar to appendix C, figures C1–C6, with the following exceptions—

(a) For OSD T&E oversight non-tactical C4/IT and space programs, the OSD DT&E, OUSD(AT&L), Director, Defense Systems, will be replaced by the Principal Director, DASD (Programs) OASD (C3I).

(b) For non-tactical C4/IT programs, OSD or non-OSD T&E oversight, the CBTDEV concurrence signature is replaced by the FP (that is, HQDA, DCS, G–1 for personnel and ASA(ALT) ILS for logistics support related TEMPs) concurrence signature.

3–6. TEMP format and content

a. Army policy requires that the Defense Acquisition Guidebook TEMP format be followed. Within this format, the level of detail is unique for each program and tailoring of the contents is encouraged.

b. Specific content guidance appropriate for Army TEMP preparation is contained in appendix D, which is not intended to be inclusive, since each specific program TEMP will be different based upon program's unique T&E characteristics and requirements. Guidance for ACAT II and III programs is the same as for ACAT I, except as noted. Exception: At the end of each section, where guidance on content differs for non-tactical C4/IT TEMPs, only that which is different is displayed.

c. Approval Page formats and layouts for programs by ACAT are provided in appendix C.

d. An example of a T&E WIPT Coordination Sheet is at figure 3–7. The T&E WIPT Coordination Sheet should depict the specific participants of a program. For example, the T&E WIPT chair should show the PM and the program name; the specific school/center should be identified as the combat developer; and so forth.

e. Per AR 73–1, paragraph 10–2*b*(8), each TEMP will include a Requirements/Test Crosswalk Matrix as Attachment 1. (See para D–6 and an example at fig D–2.)

T&E WIPT COORDINATION SHEET FOR THE
TEST AND EVALUATION MASTER PLAN (TEMP) FOR
OH-42X HELICOPTER TEMP

	SIGNATURE	DATE
Program Manager (PMO Aviation)	*Bruce Bones* LTC Bruce Bones	Concur/~~Non-concur~~ *10 Jan 02*
Combat Developer (TRADOC Proponent school)	*J T Thurston* Mr. J.T. Thurston	Concur/~~Non-concur~~ *10/1/02*
System Evaluator (ATEC-AEC)	*Roscoe P. Coltrain* MAJ Roscoe P. Coltraine	Concur/~~Non-concur~~ *10 Jan 02*
Developmental Tester (ATEC-DTC/SMDC)	*Johanna Klingman* Johanna Klingman	Concur/~~Non-concur~~ *10/1/02*
Operational Tester (ATEC-OTC)	*Buster Rhymes* CPT Buster Rhymes	Concur/~~Non-concur~~ *10 Jan 02*
Logistics Analyst (ATEC-AEC-ILS)	*Freddie L. Hill* Freddie L. Hill	Concur/~~Non-concur~~ *15/1/02*
Survivability/ Lethality (ARL-SLAD)	*Edward J. Brennan IV* Edward J. Brennan IV	Concur/~~Non-concur~~ *10/1/02*
System Trainer (TRADOC)	*Russell E. Poindexter* Russell E. Poindexter	Concur/~~Non-concur~~ *16/1/02*
Threat Integrator (USASMDC - Intel)	*Roger P. Dodger* Roger P. Dodger	Concur/~~Non-concur~~ *17/1/02*

Figure 3–7 (PAGE 1). Sample T&E WIPT Coordination Sheet

HQDA Representatives:

ASA(ALT)	Monica A. Friend Monica A Friend	Concur/~~Non-concur~~ 10/1/02
CIO/G-6	Thomas J. Loper MAJ Thomas J. Loper	Concur/~~Non-concur~~ 10 Jan 02
DUSA(OR)	Philip D. Salvo LTC Philip D. Salvo	Concur/~~Non-concur~~ 22 Jan 02
DCS, G-3	Irving R. Pilot LTC Irving R. Pilot	Concur/~~Non-concur~~ 10 Jan 02
DCS, G-8	Roger R. Wordsworth MAJ Roger R. Wordsworth	Concur/~~Non-concur~~ 10 Jan 02
Independent Logistician ASA(ALT) ILS	Katherine Beans MAJ Katherine Beans	Concur/~~Non-concur~~ 10 Jan 02
DCS, G-1	Rodney R. Rodneck MAJ Rodney R. Rodneck	Concur/~~Non-concur~~ 10 Jan 02
DCS, G-2	Thomas M. Crown MAJ Thomas M. Cowan	Concur/~~Non-concur~~ 10 Jan 02

Others as needed:

Other Services: OTAs

Other Service User's Representatives

Associate Members (as necessary):

(examples)

Target Provider (USASMDC) (Targets PO)	John F. Conn	Concur/~~Non-concur~~ 10/1/02
Flight Test Range (USAKA Dir.)	Joyce Wilhelm	Concur/~~Non-concur~~ 10/1/02

Figure 3–7 (PAGE 2). Sample T&E WIPT Coordination Sheet—Continued

Chapter 4
Critical Operational Issues and Criteria (COIC)

4–1. COIC overview

This chapter provides content and processing guidance for development and approval of COIC during systems acquisition, modification, and upgrade.

a. Philosophy. Critical operational issues and criteria are those decision maker key operational concerns, with bottom line standards of performance that, if satisfied, signify the system is operationally ready to proceed beyond the FRP DR. COIC are not pass/fail absolutes but are "show stoppers" such that a system falling short of the criteria should not proceed beyond FRP DR unless convincing evidence of its operational effectiveness, suitability, and survivability is provided to the decision-makers. COIC are few in number, reflect total operational system concerns, consider system maturity, and employ higher order measures.

b. Role of COIC.

(1) Focus and support milestone decisions. COIC prescribe (and provide a consistent primary emphasis on) the user's minimum operational expectations for the total operational system for a favorable decision at the FRP DR. (See fig 4–1.)

(2) Reduce the multitude of operational considerations to a few operationally significant and relevant mission focused issues and criteria. Based on this mission focused nature, a system, evolutionary increment, or developmental modification that satisfies the COIC is considered by the user to be the minimum operational capability necessary (that is, just good enough) to move into production and fielding while improvement toward ORD thresholds and the full operational capability continues.

(3) Serve as umbrella issues and criteria that inherently cover a system's minimum needs for operational effectiveness, suitability, and survivability without specifically addressing these categories. The COIC are relevant to both the critical mission operations and the FRP DR. COIC integrate operational mandates with maturity considerations for the total operational system.

(4) Serve to focus and prioritize the system evaluation effort, to identify operational priorities for the acquisition effort, and to foster a coordinated effort by the members of the acquisition team by identifying and understanding what is operationally important.

(5) Apply to system evaluation. COIC are not limited to operational test (OT) issues and criteria. Being operationally relevant measures, COIC must lend themselves to assessment based on OT, DT, or other applicable methods. Data to answer the COIC can come from any credible source (for example, Initial Operational Test (IOT), other OT, DT, field data collection, and studies/simulations). The system evaluator, in coordination with the T&E WIPT, develops the T&E strategy and the need for OT as well as other data sources to satisfactorily resolve the COIC. The T&E strategy is then documented in the TEMP and SEP.

c. Applicability of critical operational issues and criteria. The COIC apply to all systems (irrespective of ACAT level) during acquisition and developmental modification. During systems acquisition, the initial system will have a set of COIC applicable to the FRP DR. Each follow-on increment, if an evolutionary acquisition strategy is pursued, will have a set of COIC. COIC apply to all acquisition strategies—developmental, non-developmental, and commercial items, to include COTS. Developmental modifications are modifications that respond to preplanned product improvements identified in the original ORD or to new/revised requirements incorporated through ORD revisions. COIC supporting evolutionary acquisition and developmental modifications represent revision or refinement to the original set of COIC. Revision or refinement of COIC is not required for other system changes, such as verification of fixes to system shortcomings identified for corrections during FRP DR, Post-Deployment Software Support (PDSS), and/or routine engineering changes supporting production. In contrast to PDSS, Post Production Software Support (PPSS) applies only to system software support for those systems that have transitioned to sustainment and the Depot Maintenance OP–29 process.

d. Focus and timing of COIC. Critical operational issues and criteria are prepared and approved for inclusion in the initial TEMP for program initiation (MS B). These early COIC are based on the Mission Needs Analysis, Mission Need Statement (MNS), Requirements Analysis, initial ORD, and Analysis of Alternatives (AoA) with other documentation when needed. The COIC are updated and approved based on the updated ORD and AoA for inclusion in the TEMP approved for MS C, if conducted. COIC continually focus on the FRP decision; therefore, revision subsequent to MS C should only be necessary for significant program redirection, evolutionary increments, preplanned product improvements, and other modifications or upgrades responding to a new or revised ORD. The issues will be based on the Mission Needs Analysis and, when one exists, the MNS should remain stable during the acquisition process. The criteria reflect the maturity of the operational requirements in the ORD and AoA; therefore, they may be "soft" (that is, preliminary) initially (MS B TEMP) but will be "firm" (that is, final) standards of performance for the MS C TEMP. Performance exit criteria with appropriate operational considerations may be used to guide the intermediate milestone decisions (for example, MS B and C). Such exit criteria will be documented in the TEMP but not as part of the COIC. The majority of performance exit criteria should be relevant to achievement of the COIC. (See fig 4–1.)

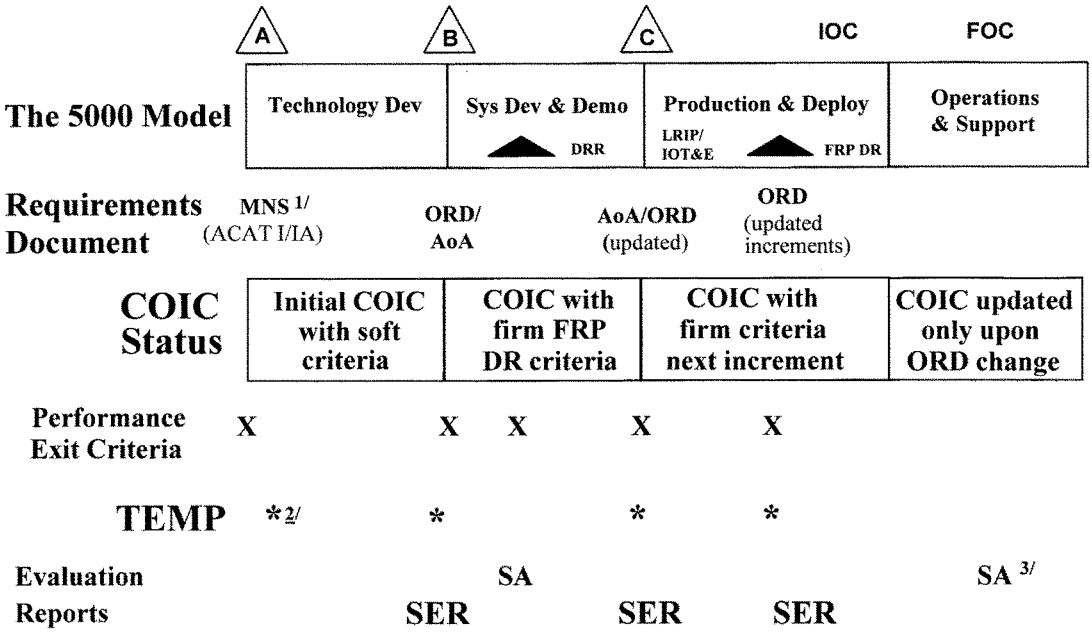


Figure 4–1. COIC in the systems acquisition process

e. Structure of COIC. Critical operational issues and criteria are prepared in sets, centered on critical operational issues. For each issue, a scope, appropriate criteria, rationale for each criterion, and a set of applicable notes are developed.

(1) *Critical operational issue.* A key operational concern, expressed as a question that, when answered completely and affirmatively signifies that a system, an evolutionary increment, or a developmental modification is operationally ready to transition at the FRP DR.

(2) *Scope for the issue.* A statement of the operational capabilities, definitions, and conditions that focus the issue and guide its evaluation.

(3) *Criteria for the issue.* Those standards of operational performance that, when all are achieved, signify that the issue has been satisfied. Criteria constitute "show stoppers" until convincing evidence of the system's operational effectiveness, suitability, and survivability is demonstrated. Each ORD KPP will be a criterion. Criteria are not limited to only KPP.

(4) *Rationale for the criteria.* Basis for criteria and an audit trail of their link to the ORD and the AoA.

(5) *Notes for the COIC.* Both mandatory and system peculiar notes apply. The mandatory notes are modified to be appropriate for the system.

f. Characteristics of a good set of COIC.

(1) Operationally relevant, mission focused issues and criteria.

(2) Overarching, total operational system measures.

(3) Include all system KPPs.

(4) No overlap or duplication among criteria.

(5) Few issues and criteria

(6) Clearly reflect why the system is being acquired.

(7) Criteria are true operational "show stoppers."

(8) Criteria are achievable and can be evaluated.

(9) Provide clear guidance on conditions applicable to measuring each criterion and for scoring the results. Avoid terms that could be misinterpreted by the organization doing the analysis and/or the evaluation.

(10) Reflect the minimal system acceptable performance for entry into FRP.

g. Team effort. Army leadership and decision-makers want COIC that correctly identify and define the key

operational concerns applicable to the FRP DR with true operational "show stopper" criteria that are achievable before and verifiable during the system evaluation in support of the FRP DR. This brings with it specific areas of focus within the roles of the CBTDEV/FP, PM/MATDEV, and System Evaluator during development, coordination, and approval processing of COIC. This team functions as a subgroup of the Integrated Concept Team (ICT) responsible for the ORD development. It is incumbent upon the CBTDEV/FP, MATDEV/PM, and System Evaluator to keep their respective leadership informed of the COIC content and status during development and approval so as to ensure their concerns and guidance are addressed and problems are identified and resolved early.

(1) The CBTDEV/FP has the lead for this effort and is specifically responsible for the operational relevance of the COIC (that is, correct issues, applicable operational conditions/scope, and true operational FRP "show stoppers"). The CBTDEV/FP also must ensure that any doctrine (including TTP), training, leader developments, organization, and soldier products for the system can be developed and sufficiently matured for evaluation with the materiel provided by the PM/MATDEV. The CBTDEV/FP will have to coordinate with the respective developers of doctrine, training, and organizations in scheduling and developing their products.

(2) The PM/MATDEV is responsible for assuring that the technical feasibility of the program (including the system development contract) is able to deliver materiel (for example, hardware, software, and logistics) for evaluation capable of satisfying the criteria. If this is unachievable, the PM/MATDEV advises the CBTDEV/FP and System Evaluator during development of the COIC. The inability to deliver a system capable of satisfying the criteria is a condition for PM/MATDEV nonconcurrence with the COIC during coordination and processing.

(3) System Evaluator determines if the COIC can be answered and provides concepts and plans for answering them. The system evaluator will coordinate with developmental and operational testers, M&S organizations, and training exercise organizations, as applicable. In some cases, these organizations may need to participate in the COIC development. Inability to answer an issue or verify achievement of one or more criteria is a condition for evaluator nonconcurrence during coordination and approval processing of the COIC.

4–2. COIC relationships

COIC are derived from documented operational requirements to reflect those minimum essential operational concerns and operational performance standards essential to FRP authorization. Accordingly, COIC development relies upon many activities and documents associated with requirements determination and definition, system acquisition, and system fielding. COIC serve as a primary focus for the system evaluation supporting the FRP DR to aid in the overall evaluation of the system's operational effectiveness, suitability, and survivability, as well as identification of improvements needed. Inherently, the COIC serve to guide the acquisition and development effort by identifying those system operational performance capabilities and standards that the user representative (that is, CBTDEV or FP, as applicable) considers most important. These relationships are depicted in figure 4–2.

a. COIC and operational requirements. Operational requirements, along with key employment considerations, are essential to establishing operationally valid, relevant, and credible COIC. The operational requirement is reflected in the Mission Needs Analysis, MNS, Requirements Analysis, ORD, and AoA.

(1) *COIC and operational requirements documents.* The critical operational issues will be based on the MNS (or the Mission Needs Analysis when MNS is not produced) and thus unlikely to change as the program proceeds. The criteria will be based on the ORD, along with the associated Requirements Analysis, and, thus, change as the requirements mature. This does not mean that issues and criteria should always be direct lifts from these documents; rather there should be a clear, auditable foundation for the issues and criteria in these documents. For example, the ORD may require a significant survivability improvement over the existing system, whereas the AoA and cost considerations may result in a criterion to complete 20 percent more missions with 50 percent more threats neutralized. The rationale for COIC provides a crosswalk between the ORD minimum acceptable requirements and the criteria. While the COIC development for an existing system may rely on a validated ORD, COIC development for future systems should occur concurrently with the ORD development.

(a) COIC and ORD KPP. All KPP are included as criteria and are direct lifts from the ORD. KPP are by definition FRP DR "showstoppers." Figure 4–3 depicts the salient characteristics of KPP and COIC. Additionally, each KPP must be clear, measurable, testable, and achievable. When writing the ORD KPP, the ORD developer tailors a set of KPP that serve as criteria for the COIC, thus, simplifying the acquisition process by providing a single requirement document (that is, the ORD) and COIC development/approval to mostly extraction from the ORD.

(b) COIC and other ORD requirements. When the existing ORD does not include KPP that provide a complete set of overarching requirements reflecting a good enough system for entry into FRP, the other ORD requirements serve as a basis for development of the criteria. Often the ORD rationale statement is a better source for COIC requirements than the actual requirements because they may be more overarching and operational in focus. Additionally, the AoA, specifications, experiments, and study results may have to be used in conjunction with the ORD criteria to develop COIC. Also, the ORD requirements should be assessed in the system evaluation per the Defense Acquisition Guidebook. The other ORD requirements serve to identify satisfactory achievements that do not need further attention as well as specific shortcomings that need improvement as the system moves into FRP and fielding.

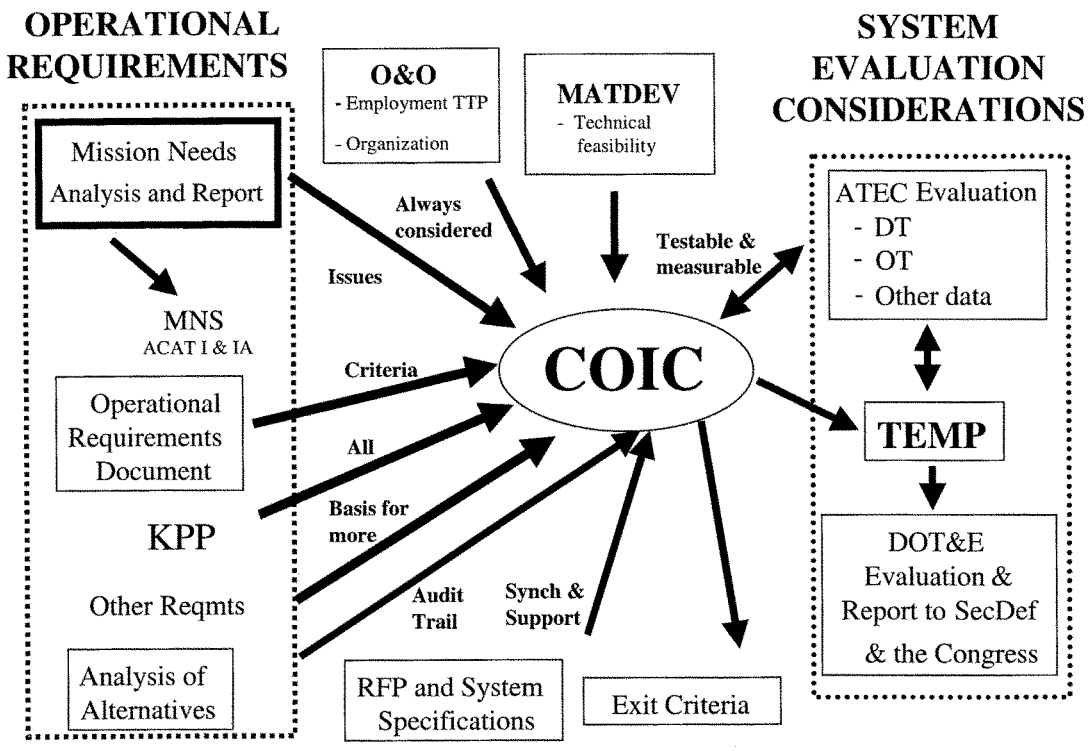


Figure 4–2. COIC relationships

(2) *COIC and AoA.* The AoA is the primary analytical document of operational consideration during MS B decisions. It compares the relative cost and operational effectiveness for alternative concepts considered and indicates their relative status to the baseline. As such, it represents significant expectations for the concept chosen to proceed. For instance, if the AoA shows a significant cost savings over the baseline and this is the purpose of the acquisition (modernization), then the criteria should reflect a system that is as mission capable, trainable, and sustainable in combat as the existing system. The AoA uses various MOPs that aid in establishing criteria for the COIC. Because of the significance of the AoA to the program, there must be an audit trail of consideration among the COIC, ORD, and AoA. The Defense Acquisition Guidebook encourages linkage between MOE/MOS (AoA and system evaluation plan), system requirements (ORD and specifications), and T&E (COIC and CTP) for ACAT I and IA programs. This linkage allows for evaluation of whether the system remains cost and operationally effective when performance shortfalls are found during T&E. The COIC will have an audit-trail to the AoA where possible and be identified in the rationale.

b. COIC and system specifications. The primary objective is compatibility between the COIC and the System Specifications (or contract represented by the specifications). The MATDEV/PM assures this compatibility and advises the CBTDEV and system evaluator when an incompatibility exists. If an incompatibility exists, then the ORD takes precedence or an Army leadership decision is needed. Incompatibility represents a serious situation in that the contract will be insufficient to allow the system to fulfill the minimum user needs, thus jeopardizing a successful FRP DR. Occasionally the specifications include operational performance parameters based upon specific features that were not included in the ORD, but affect the criteria. Changes to the ORD and/or System Specifications may occur as a result of the COIC development and approval process.

c. COIC and other requirements documents (studies and cost). When the MNS/ORD, AoA, and System Specifications do not provide all requirements information needed to develop a valid set of COIC, other sources (such as studies, experiments, and cost analyses) are addressed. Most of the time, these sources are considered in establishing MNS/ORD requirements (for example, operation and support costs are used to establish reliability and maintainability requirements considered during COIC development).

d. COIC and operational employment considerations. To produce operationally realistic and valid COIC, the COIC must focus on the critical operational mission(s) assigned to the system, its organization, system employment TTP, and leadership implications. An understanding of how the system fights, operates, and functions is critical to determining if system- or organizational-type measures should apply (for example, a system that fights as an element of a platoon, with target detection and hand-off for engagement accomplished internal to the platoon, should not be measured as a

single, stand-alone system but as a platoon). Similarly, an understanding of how system operations will be logistically supported is essential in defining sustainment COIC. Operational requirements must, therefore, be examined in light of operational employment considerations to arrive at meaningful criteria for COIC. Also, the employment conditions or constraints (for example, day, night, limited visibility, specific battlefield conditions, critical payloads, line of sight, non-line of sight, and queuing) must be addressed in either the scope or criteria of the COIC.

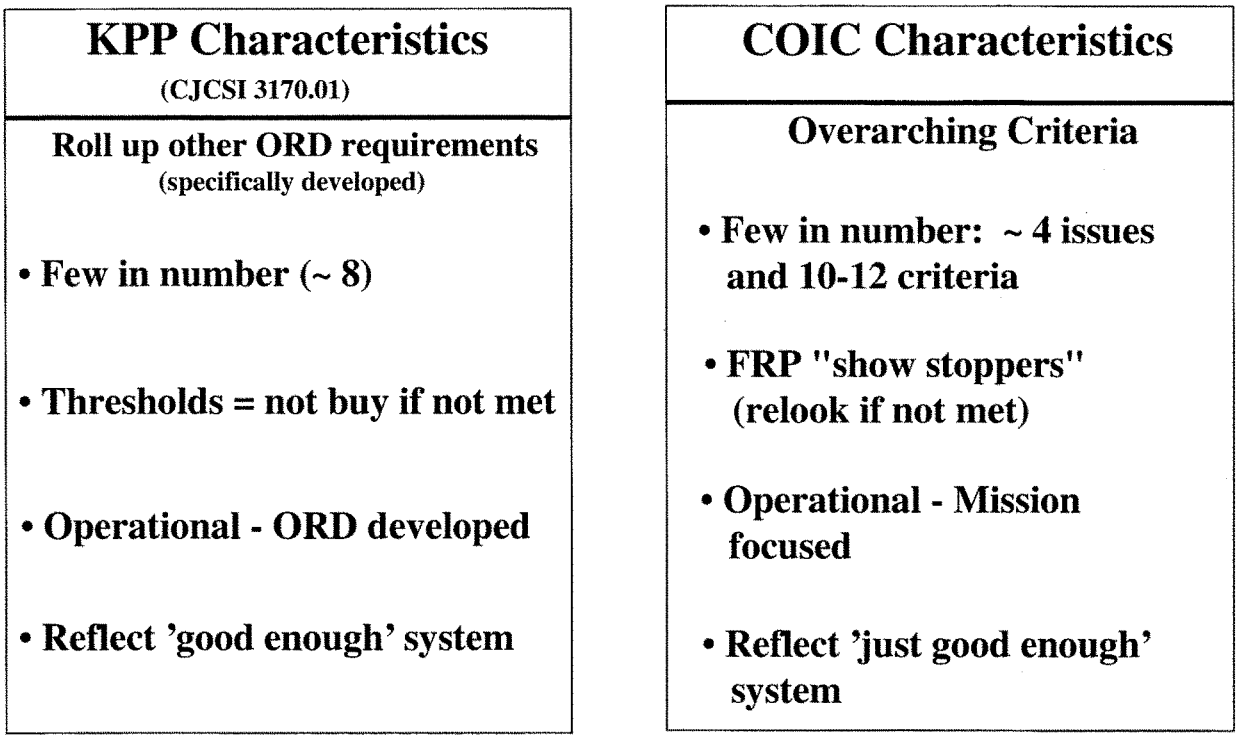


Figure 4–3. KPP–COIC relationship

e. COIC and performance exit criteria. Criteria, by definition, are bottom line standards that, if satisfied, indicate that a system is operationally ready to proceed at the FRP DR. Performance exit criteria, meanwhile, are established in accordance with DODI 5000.2 and the Defense Acquisition Guidebook at each milestone for the next milestone and for major events between milestones. While documented in the TEMP, such exit criteria will not be part of the COIC. The majority of the performance exit criteria should be relevant to achievement of the criteria. They are minimum requirements that must be successfully demonstrated for the program to proceed to the next acquisition milestone. Performance exit criteria, as such, serve as decision point measures of progress, or "stepping stones" toward achievement of COIC and eventually, the mature system's objective performance. While the CBTDEV has the lead in developing the COIC, the PM/MATDEV has the lead in developing exit criteria and does so with the assistance of the CBTDEV in coordination with the system evaluator. When separate MS C and FRP DR criteria exist, MS C performance exit criteria will normally measure technology maturity and the feasibility of fulfilling operational needs/requirements and readiness for the system to begin LRIP. The FRP performance exit criteria and COIC will focus on a mission capable, supportable, and life-cycle affordable system. The relationship of COIC and performance exit criteria, from MS B to FRP DR, is depicted in figure 4–4.

f. COIC and the system evaluation. The system evaluator is responsible for planning a complete and comprehensive system evaluation that—

(1) Provides an independent evaluation or assessment of system operational effectiveness, suitability, and survivability as well as the system's ability to perform its operational mission(s) in the expected operational environment. This includes development of Additional Issues (AI) so as to fully address operational effectiveness, suitability, and survivability (see chap 5) and being able to indicate or isolate the cause of operational shortfalls whenever possible.

(2) Provides timely advice to PM/MATDEV and CBTDEV/FP on the progress of their respective components of the

system toward achievement of the COIC and AI during the system's acquisition process. Such assessments allow these developers to adjust their program to provide needed corrective actions early in the system's acquisition process.

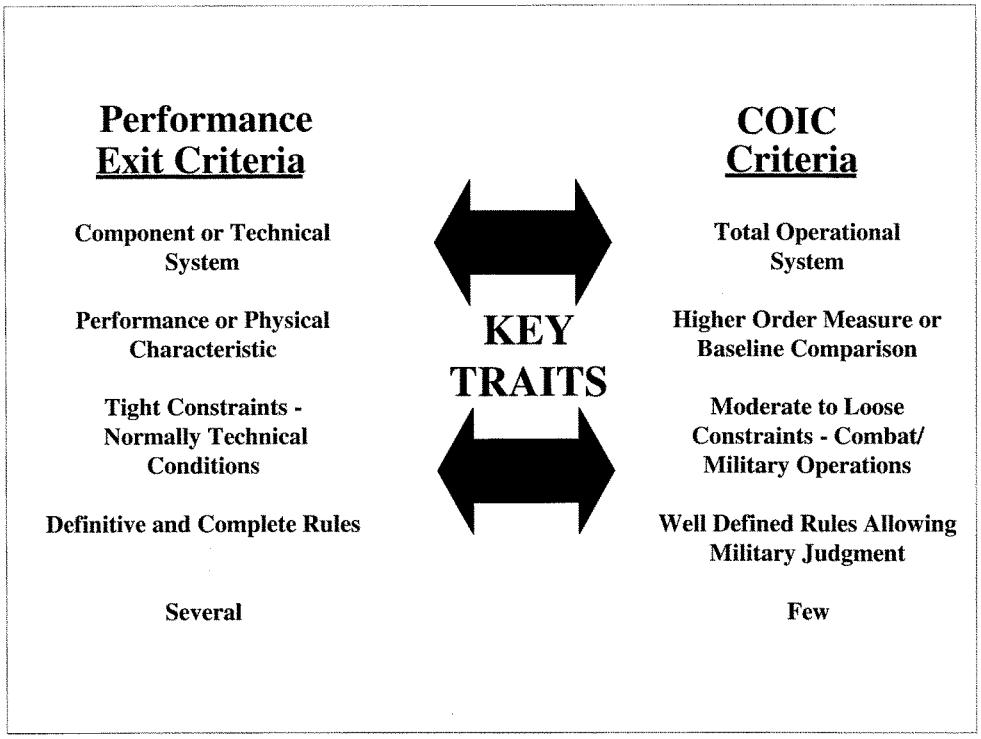


Figure 4–4. Relationship of COIC and performance exit criteria

(3) Answers the COIC for the FRP DR. Any source of data (for example, operational test, developmental test, study, experiments, and/or surveys) judged credible by the system evaluator can be used to answer the COIC. The SER reports the system's achievement against the COIC and AI and must be clearly articulated for decision-makers and action officers. However, the system evaluation reporting for the FRP DR is not limited to only the COIC assessment. The system evaluator must clearly describe the evaluation approach. The system evaluator also provides interim assessments of the status and risks for achievement of the COIC leading up to the FRP DR, particularly in the case of a MS C (LRIP decision). Plans and reports for system evaluations after the FRP DR will use these same COIC, unless evolutionary acquisition, Pre-planned Product Improvement (P3I), or a revised ORD apply to the evaluation and the operational requirements demand change in the COIC (for example, new or revised KPP). The COIC are first documented in the TEMP prior to MS B to influence the program and evaluation planning and conduct leading to MS C.

(4) Determines whether the ORD requirements have been satisfied.

g. COIC and system evaluation measures. Chapter 5 discusses the system evaluation measures in further detail. COIC are an essential element to formulate a comprehensive evaluation strategy.

(1) To plan and accomplish the system evaluation, the evaluator prepares a comprehensive and definitive set of measures of performance, effectiveness, and suitability from both the operational and technical perspectives. The COI and AI are the evaluation issues for which the system evaluator defines measures. The generation of these measures gives the system evaluator an enormous amount of latitude with regard to the scope and focus of the system evaluation. However, inappropriate measures may result in unnecessary, increased T&E resource requirements or in misleading the acquisition community and decision-makers. Informal, early coordination of the evaluation measures with the CBTDEV/FP and MATDEV/PM should be the norm for the system evaluator and should be sought by the CBTDEV/FP and PM/MATDEV to avoid major problems late in the program (for example, during the SEP development).

(2) Although the focus of COIC is the minimum system operational capabilities needed (that is, what is operationally good enough) for a go-ahead decision at the FRP DR, system evaluation measures focus on a complete and

comprehensive evaluation of the system's operational effectiveness, suitability, and survivability. The system evaluation reports whether the system can perform (effective, suitable, and survivable) all missions and attempts to isolate cause of problems when possible (see figs 4–5 and 4–6).

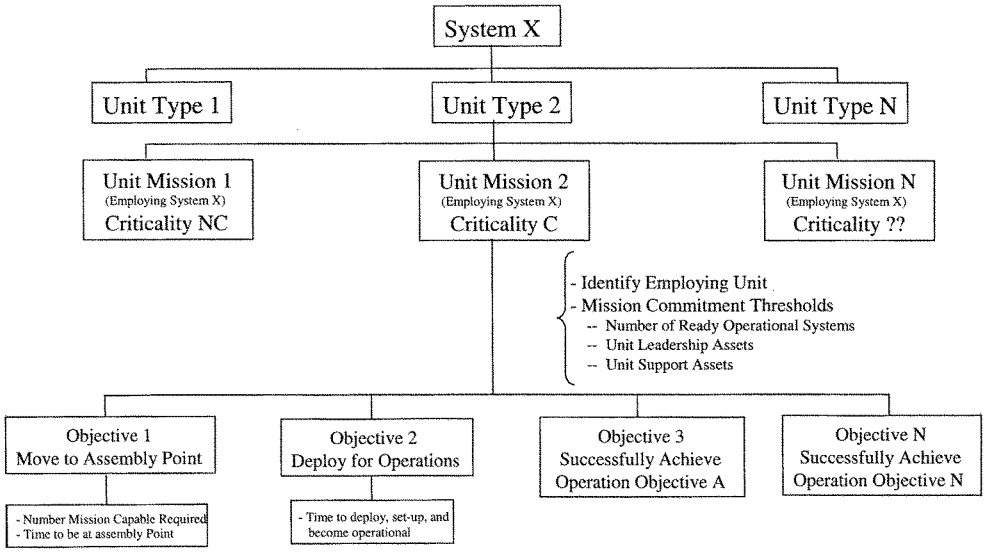


Figure 4–5. COIC mission capability dendritic

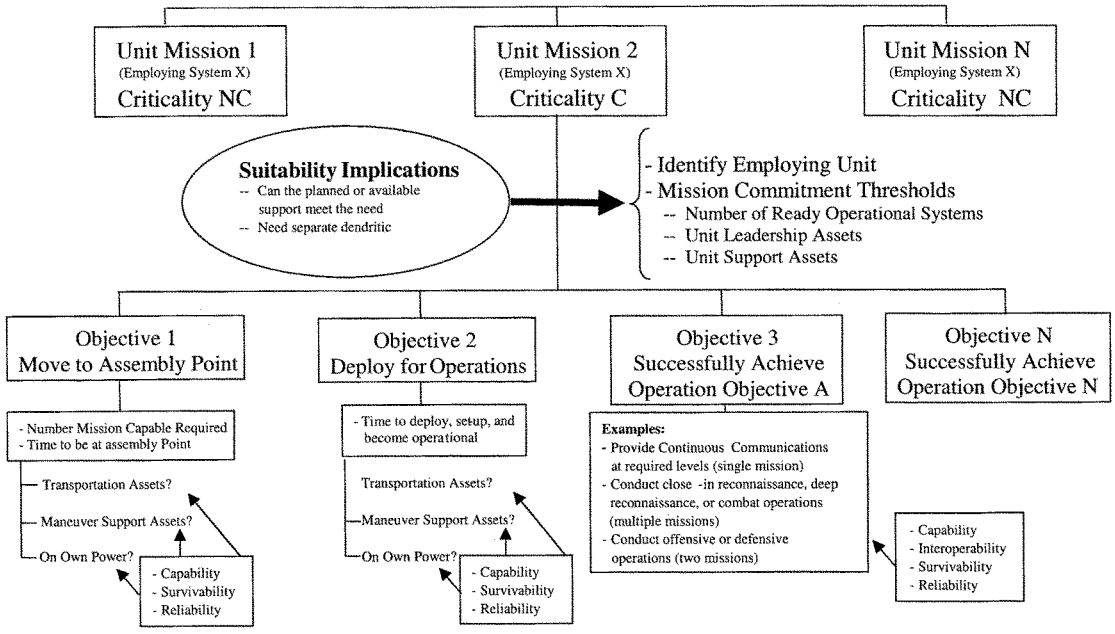


Figure 4–6. System evaluation mission capability dendritic

(3) System evaluation measures support or complement COIC resolution as follows (see fig 4–7):

(a) Allow the system evaluator to specify the data required from multiple sources for COIC not directly answerable from a single data source. For testers, analysts, and system evaluator execution purposes, these measures are just as critical as the COIC they support. If the data are not provided, the system evaluator will not be able to evaluate the issues for the FRP DR.

(b) Provide the system evaluator the diagnostics to identify factors contributing to or causing a performance shortfall for one or more of the COIC.

(c) Complement the COIC by providing a comprehensive evaluation of all aspects of the total operational system. In the event of a performance shortfall for one or more COIC, the evaluation measures may provide the evidence needed to convince decision-makers that the system is good enough to proceed (for example, baseline comparison or accomplishment of specific ORD thresholds inherently covered within an overarching COIC). Even when the COIC are satisfied, the evaluation measures normally identify areas for continued improvement as the system proceeds in acquisition (for example, fixes for shortfalls against ORD thresholds or where continued effort toward ORD objective values has significant operational benefit). The system evaluation may also serve to identify a measure of critical importance that was not identified during the COIC development process.

4–3. Development and approval processes for COIC

a. Appendix E provides detailed COIC format and content guidance.

b. Figure 4–8 depicts an overview of the COIC process. Appendix F provides detailed COIC process guidance for materiel, tactical C4I/IT, and non-tactical C4/IT programs.

(1) COIC Development Concurrent with the ORD. COIC are initially developed with the ORD and refined with the ORD. The CBTDEV has the lead for the ORD and COIC development processes for materiel and tactical C4/IT programs. The FP has the lead for the ORD and COIC development processes for non-tactical C4/IT programs.

(2) Coordinating Draft COIC with MACOM headquarters, T&E WIPT, and AoA organization. Per figure 4–8, the draft COIC are readied for and begin coordination while the ORD is in staffing. While the CBTDEV/FP has the lead for the documents being coordinated, it is a team effort with the MATDEV/PM and system evaluator. The T&E WIPT uses the initial COIC to build the draft TEMP. Subsequent refined versions of the COIC are included in the TEMP until the ORD and COIC are approved, at which point the TEMP is readied for approval.

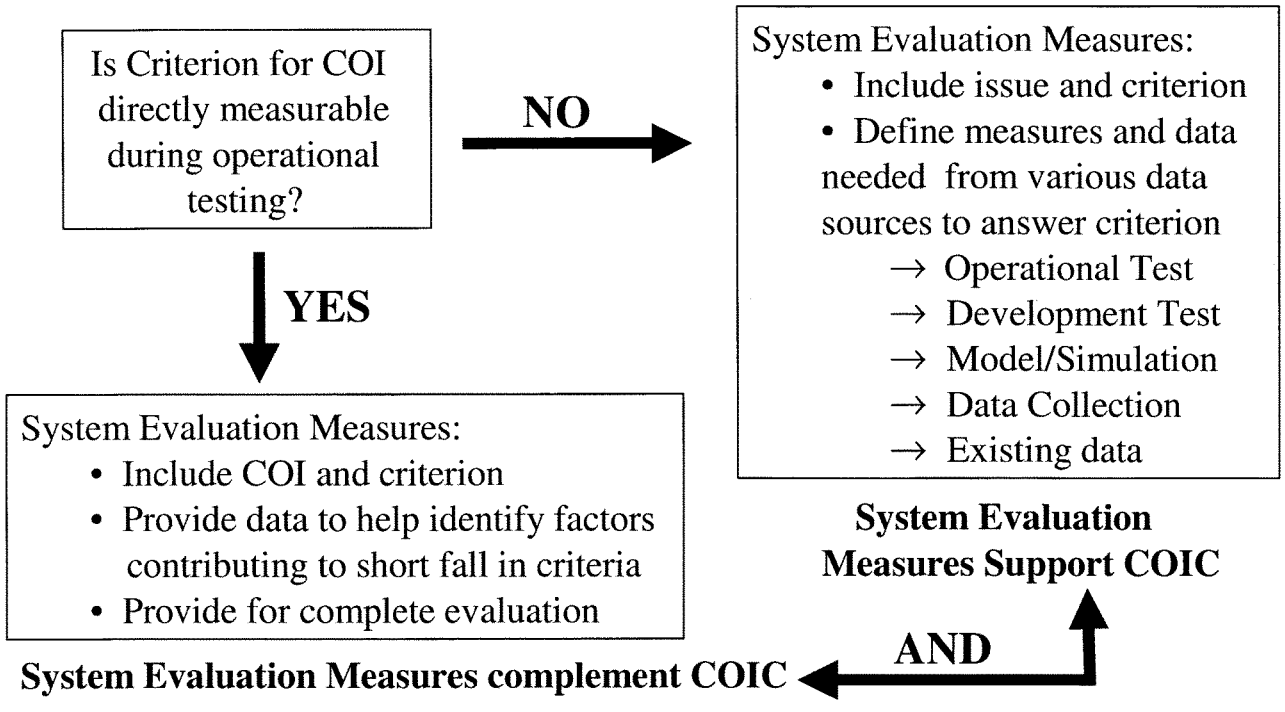


Figure 4–7. COIC relationship to system evaluation measures

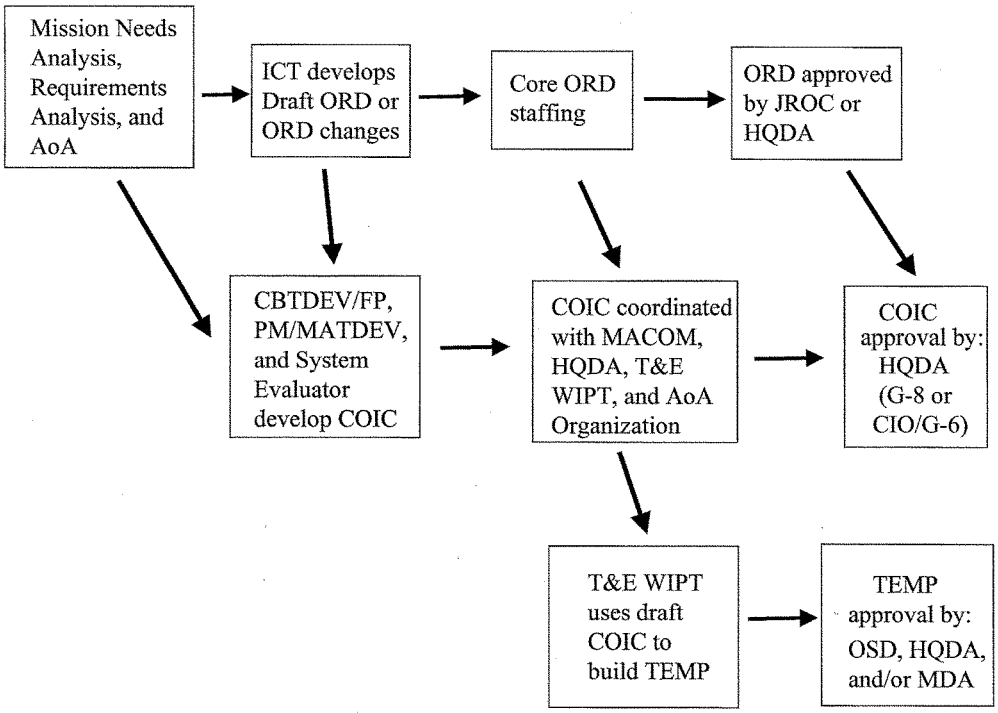


Figure 4–8. COIC process overview

(3) Similar to the ORD approval, HQDA approves all COIC. For materiel and tactical C4I/IT programs, the Deputy Chief of Staff (DCS), G–8 approves the COIC. HQDA (CIO/G–6) approves all non-tactical C4/IT program COIC. An ORD that includes a synopsis of the analysis results must be approved before COIC can be approved. The ORD–COIC "Crosswalk" Matrix (see fig 4–9) is a key element during the COIC approval process at HQDA (that is, DCS, G–8 and CIO/G–6). The matrix is encouraged for use during proponent reviews as well. Additionally, the matrix will be the basis for the mandatory Attachment 1 to the TEMP (that is, Requirements/Test Crosswalk Matrix). (See para 3–6*e* and fig D–2 of this pamphlet.)

4–4. COIC–ORD–TEMP schedule synchronization

A synchronized schedule among the ORD, COIC, and TEMP, as well as other events during a system's acquisition is critical to avoid delays in the TEMP approval process. The "long pole" in the process is ORD approval, especially when HQDA and JROC approvals are required as shown in figure 4–10. Detailed schedule planning factors and critical events for synchronization are provided at appendix F.

4–5. COIC approval guidelines and staffing considerations

a. Table 4–1 identifies the COIC approval authorities.

Table 4–1
COIC approval authorities

Program type	Approval authority	Package address
ACAT I and ACAT IA (Tactical)	HQDA DCS, G–8 (Director, Force Development)	THRU: CG, ATEC FOR: HQDA, ATTN: DAPR–FDR
ACAT IA (Non-Tactical) and all Non-Tactical C4/IT with OSD or HQDA T&E Oversight	HQDA (CIO/G–6) (general officer)	THRU: CG, ATEC FOR: HQDA, ATTN: SAIS–ION
ACAT II and III Materiel and Tactical C4I/IT	HQDA DCS, G–8 (Director, Force Development)	THRU: CG, ATEC FOR HQDA, ATTN: DAPR–FDR
ACAT II and III Non-Tactical C4/IT without OSD or HQDA T&E oversight	HQDA (CIO/G–6) Colonel or civilian equivalent	FOR: HQDA, ATTN: SAIS–ION

b. A team effort among the CBTDEV/FP, PM/MATDEV, and system evaluator is imperative and is reflected in the COIC process by the requirement for the CBTDEV/FP to obtain command positions from PM/MATDEV and ATEC before submission to HQDA for approval. PM/MATDEV should nonconcur if the capabilities or performance required by the COIC are not technically feasible or achievable by the FRP DR. ATEC should nonconcur if the capability or performance required by the COIC cannot be evaluated by the FRP DR. Both cases preempt the FRP decision because capabilities that the user representative says must be present to enter FRP either cannot be delivered or confirmed. In the case of OSD T&E Oversight programs, DOT&E will report to the Congress the inability to satisfy the mission need as an ineffective or unsuitable system for FRP, unless some convincing evidence is presented before the DOT&E Beyond LRIP (BLRIP) Report is rendered. Avoid setting firm criteria too early (for example, Milestone B) if the FRP decision is to follow Milestone C. Approval of the firm COIC may be completed in support of a TEMP update between Milestone B and C. This strengthens CBTDEV/FP credibility by allowing time for the requirement to mature and program to stabilize.

c. COIC Staffing and Approval Submission Packages are described below.

(1) *Materiel and Tactical C4I/IT Programs.* The staffing and approval package consists of a cover memorandum, the proposed draft COIC (fig E–2), and the ORD–COIC Crosswalk Matrix (fig 4–9). The CBTDEV proponent submits the COIC package to the MACOM HQ. The MACOM staffs the COIC with the PM/MATDEV and ATEC for their command positions and submits them through CG, ATEC to HQDA (DCS, G–8) for approval. Sample memoranda for the CBTDEV proponent COIC submission, MACOM HQ staffing with the PM/MATDEV and ATEC, and MACOM HQ COIC submission to HQDA (DCS, G–8) are at appendix F. Throughout the process both hard copy documents and electronic files are passed in order to speed the process.

(2) *Non-Tactical C4/IT Programs.* The staffing and approval package consists of a cover memorandum, the proposed draft COIC (fig E–2), and the ORD–COIC Crosswalk Matrix (fig 4–9). The FP submits the COIC package to the MACOM. The MACOM staffs the COIC with PM/MATDEV and ATEC and submits them through CG, ATEC to the HQDA (CIO/G–6) for approval. Sample cover memoranda for the FP COIC submission, MACOM HQ staffing with PM/MATDEV and ATEC, and MACOM HQ COIC submission to the HQDA (CIO/G–6) are at appendix F.

SAMPLE ORD-COIC CROSSWALK

Medical Communications for Combat Casualty Care (MC4) System

ORD Reference (*indicates a KPP)	Critical Operational Issues and Criteria
Supports the requirement that the Service supplied computer hardware used to run the TMIP software must meet the minimum hardware requirements stated in the TMIP TEMP. 1.f. (2) (a), page 10: The MC4 program will "develop the Army's infrastructure for the utilization of the Joint TMIP software." 4.a (2), page 28: The MC4 system has the mission to "provide the computer infrastructure for the Army's implementation of the Joint TMIP software. As needed, development software for Army-unique medical requirements not met by TMIP." *4.b (2) (a) i, page 31: The MC4 computer hardware must be able to run the operating system utilized by TMIP.	1.2.1.2 The MC4 computers must provide significant processor speed and memory capacity to run the TMIP software. 1.2.1.3 Any MC4 supplied software must be compatible with the TMIP software.

Figure 4–9. Sample ORD–COIC Crosswalk Matrix

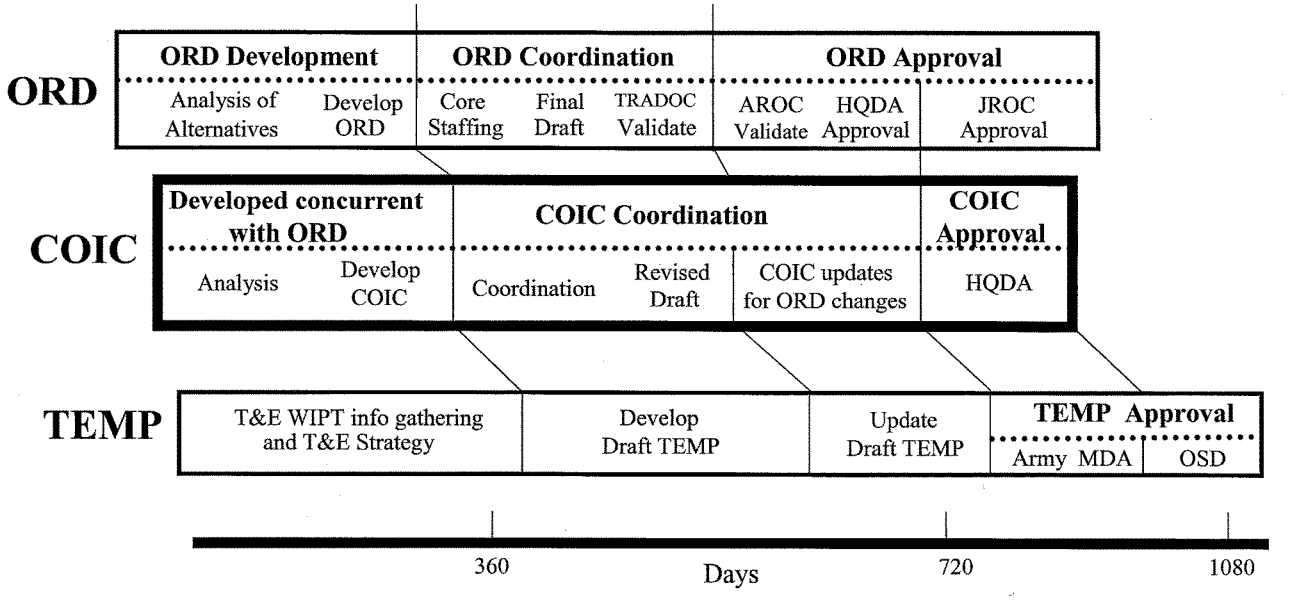


Figure 4–10. Time synchronization of ORD, COIC, and TEMP

d. Approval memorandum requirements follow.

(1) *Materiel and Tactical C4I/IT Programs.* COIC for materiel and tactical C4I/IT programs are approved by the HQDA Director, Force Development, G–8 and forwarded to the applicable PM/MATDEV for inclusion in the TEMP with copies furnished the CBTDEV proponent, MACOM HQ, and AEC. Samples of COIC cover memoranda are at appendix F.

(2) *Non-Tactical C4/IT Programs.* COIC for non-tactical C4/IT programs are approved by the HQDA (CIO/G–6). Either a general officer or colonel (or civilian equivalent) approves the COIC depending on whether OSD or HQDA T&E oversight applies (See http://www.hqda.army.mil/tema/temp_status.doc for listing of oversight programs). The HQDA (CIO/G–6) COIC approval authority forwards the approved COIC to the PM/MATDEV for inclusion in the TEMP with copies furnished the FP, MACOM HQ, and AEC. Samples of COIC approval memoranda are at appendix F.

4–6. COIC update considerations

a. Update between MS B and C for the initial FRP DR. COIC are updated as a program proceeds through the acquisition process and as the ORD progresses in its development and approval. COIC are initially developed for the TEMP supporting MS B with "soft" criteria reflecting the lack of maturity in the ORD requirement. The COIC supporting the TEMP for MS C will have firm criteria. If there is no MS C, the ORD and COIC must be finalized sufficiently in advance of IOT (or other testing/data gathering events supporting the FRP DR) to allow for TEMP update and approval in advance of IOT.

b. Update in support of TEMP revision supporting the FRP DR. Only update the COIC for the FRP DR when there are ORD capabilities still to be delivered (that is, future evolutionary acquisition increments and preplanned product improvement set forth in the ORD) and the effort is being approved by the FRP DR. Generally, firm criteria should only be provided for the next increment capability with soft criteria (or to be determined notes) applicable to criteria for future increments. Revised COIC are not needed to support follow-on testing beyond the FRP DR if correction of shortcomings do not require future minimum user needs (that is, operational efficiency and user preference for system increases as performance improves).

c. Update after FRP DR. There are two reasons for updating the COIC after the FRP DR:

(1) The COIC were incorrect and change was identified during the T&E process and FRP DR or

(2) An ORD change is occurring requiring additional capability(ies). If the T&E process and FRP DR determined that one or more criteria were not met at the FRP DR, then the criteria must be deleted or added to future increments. The complete rationale must be provided justifying inappropriate use of the criteria as a "show stopper" for the FRP decision and the course of action recommended. The rationale for such change should have been documented in the system evaluation and/or FRP acquisition decision memorandum. Administrative changes to the ORD do not require

COIC changes. After the FRP DR, the COIC will change only when new capabilities are added that add to, or change, or existing "show stopper" requirements.

4–7. COIC checklist

A COIC checklist is provided at appendix G for use in preparation, review, and processing of COIC. The checklist addresses both content and processing of COIC.

4–8. COIC development example

Appendix H contains a COIC development example using a plausible situation and providing a school solution.

4–9. COIC procedures for joint and multi-Service programs

COIC apply to joint and multi-Service programs whether the Army is the lead or a participating Service. Either total program or Army-only COIC will be developed, approved, and included in the TEMP. Guidance of this pamphlet applies regarding content, focus, and Army approval processing of COIC. Army participants in joint and multi-Service programs will familiarize other Service participants with the Army COIC procedures, because COIC are peculiar to the Army. The T&E WIPT for a joint program may decide to apply Army COIC guidance and build COIC for the TEMP in which case the Army COIC will be embedded in the overall set of program COIC. When the Army is lead for a joint or multi-Service program, a single integrated set of COIC will be developed and approved for inclusion in the TEMP. Army COIC approval procedures will be as set forth in this pamphlet. Other Services will be responsible for approval processing of the COIC within their respective Services. For those programs where the Army is a participant (that is, not the lead Service), Army COIC will be developed, approved, and included in the TEMP as an appendix. The issues should be those COIs determined by the program T&E WIPT for inclusion in Part IV of the TEMP that are applicable to the Army. The nature of joint and multi-Service programs often leads to compromises regarding certain required capabilities in order to acquire a system useable by all involved Services. Criteria will reflect these compromises. Materiel developers and system evaluators must continue their respective roles, addressed above, in order for the criteria to be realistically achievable and evaluated. Other Service representatives must understand the serious implications of these activities relative to FRP DR, particularly when a system is on the OSD T&E Oversight List.

Chapter 5
System Evaluation

Section I
Introduction

5–1. Overview of system evaluation

Conducted by the system evaluator, the system evaluation is a program level analytical process that supports the systems acquisition process and provides information to the CBTDEVs and MATDEVs, decision-makers, and other members of the acquisition team on the status of the system. System evaluation begins as early as possible in the life cycle of a system (for example, as early as the battlefield functional mission area analysis for materiel systems and the Information Management Plan for IT systems). Evaluation continues through the system's post-deployment activities.

a. Continuous evaluation (CE) is the approach used to implement system evaluation. CE is conducted throughout the systems acquisition process. It emphasizes the role of the system evaluator and ensures a responsible, timely, and effective assessment of the progress toward a mature system.

b. CE may produce a System Assessment (as necessary) at specific points to assess technical risks, address performance and support requirements, assess potential operational effectiveness, suitability, and survivability, examine logistic and training supportability, support the type classification and materiel release, and determine interoperability with other Army systems, other U.S. Services, North Atlantic Treaty Organization (NATO), and other allies' systems.

c. At each milestone decision review (except MS A) and the FRP DR, the system evaluation process produces a SER that focuses on the system's progress toward satisfying the threshold or objective requirements (for example, the COIC); provides demonstrated operational effectiveness, suitability, and survivability (ESS); identifies acquisition and operational risks; and recommends future course(s) of actions for the MATDEV/PM and CBTDEV.

d. Early involvement of the system evaluator in the acquisition process, vis-à-vis the Integrated Concept Team, is vital to a successful systems acquisition program. This early involvement ensures appropriate data are available to support the system evaluation objectives, and that all credible data and resources are used effectively and efficiently. The system evaluator works closely with the analytical, test, and training communities, MATDEV, and CBTDEV to ensure that explicit and implicit system evaluation requirements placed on these organizations are clearly understood and are obtained in a timely and efficient manner in support of the system evaluation.

5–2. Scope of system evaluation

System evaluation encompasses a broad analytical approach to the evaluation of an acquisition program from earliest concept definition through post deployment and sustainment. A continuous approach to system evaluation has evolved to include examination of developmental, production, and post-fielding system effectiveness to provide extensive coverage of acquisition events. A CE approach requires the system evaluator to—

a. Identify the specific mission tasks and system functional capability to be studied and evaluated over the acquisition life cycle.

b. Consider the physical, military, and civilian environments to be encountered by the acquisition system.

c. Determine the events, to include the system and mission-level measurements and data requirements necessary to verify the adequacy of system attributes (for example, mission and technical performance, training, reliability, availability, maintainability, tactics, logistics support, and software) and to determine the accomplishment of mission-level tasks.

d. Require timely execution of such events to ensure technical and operational readiness for IOT, when conducted.

e. Monitor the events and assess the adequacy of the system with respect to its stated requirements.

f. Monitor the corrections applied and assess the adequacy of the corrective actions to the identified deficiencies.

g. Periodically report on the status of the system with respect to its technical and operational attributes to the CBTDEV/TNGDEV/FP, MATDEV/PM, and milestone decision principals, as appropriate.

5–3. Objectives of system evaluation

The major objective of the system evaluation is to address the demonstrated system ESS of Army and multi-Service systems for use by typical users in realistic operational environments. During development, the system evaluation provides developers and decision-makers with a comprehensive assessment of a system's ability to meet the stated need in its current state of development and estimates the potential for a successful, mature configuration. Ultimately, it provides an evaluation of how the system performed with respect to its intended mission in its intended environment based on the system requirements. Other system evaluation objectives are—

a. Determine the degree to which the critical operational issues have been addressed.

b. Discover critical problems, either technical or operational, at the earliest opportunity so that they may be addressed and resolved by either the CBTDEV/FP or MATDEV/PM before they affect major decisions.

c. Support the formulation of realistic system operational requirements and technical specifications and ensure they are measurable and testable.

d. Provide for early and frequent assessment and reporting of a system's status during development.

e. Compare system development efforts against existing DOD mandates to determine scope of compliance (that is, Defense Information Technology Security Certification and Accreditation Process (DITSCAP), JTA, and COE) as well as any potential compliance migration efforts, especially during PPSS and PDSS.

f. Support having operationally effective, suitable, and survivable systems transition from development into production.

g. Reduce test time and cost through comparison analyses, data sharing, and use of all credible data sources (such as, M&S).

h. As required, provide assessments of system capabilities and burdens after deployment.

5–4. System evaluation in support of systems acquisition and development

The emphasis of the system evaluation, and its supporting testing, changes as the system moves through design and engineering toward a fully mature system ready for fielding. This section provides information on the types of evaluation and the data sources needed in each phase of the systems acquisition process. This guidance is provided for those systems that are entering the acquisition model at MS A; however, the flexibility of the model allows each program to adapt these guidelines as appropriate. A SER is required at each MS decision (except MS A) and the FRP DR. SAs are prepared at other decision points or as requested.

a. Systems acquisition overview (see para 1–5).

(1) Acquisition strategies. The acquisition strategy defines how the program is structured to achieve full capability. AR 70–1, Army Acquisition Policy, identifies two approaches: evolutionary and single step to full capability. The approach to be followed depends on the availability of time-phased requirements in the ORD, the maturity of technologies, the relative costs and benefits of executing the program in blocks versus a single step, including consideration of how best to support each increment when fielded. The rationale for choosing one of these approaches will be addressed in the acquisition strategy.

(2) Spiral development. Either acquisition approach (that is, evolutionary or single step) involves an iterative process for developing a set of operational capabilities known as spiral development. In this process, the requirements are refined through experimentation and risk management, there is continuous feedback, and the user is provided the best possible operational capability. The spiral development process provides an opportunity for interaction between the user, tester, and developer. Spiral development, including software, implements evolutionary acquisition.

(3) Evolutionary acquisition. The evolutionary acquisition strategy is the preferred approach to satisfying operational needs. Evolutionary acquisition strategies define, develop, and produce/deploy an initial, militarily useful capability ("increment I") based on proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities and plan for subsequent development and production/deployment of increments beyond the initial capability over time (increments II, III, and beyond). The scope, performance capabilities, and timing of subsequent increments are based on continuous communications among the requirements, acquisition, intelligence, and budget communities. In planning evolutionary acquisition strategies, PMs are required to strike an appropriate balance among key factors, including the urgency of the operational requirement; the maturity of critical technologies; and the interoperability, supportability, and affordability of alternative acquisition solutions.

(a) Evolutionary acquisition is an approach that fields an operationally useful and supportable capability in as short a time as possible. This approach is particularly useful if software is a key component of the system and is required for the system to achieve its intended mission. Evolutionary acquisition delivers an initial capability with the explicit intent of delivering improved or updated capabilities in the future.

(b) In an evolutionary approach, the ultimate capability delivered to the user is divided into two or more increments, with increasing levels of capability. Deliveries for each increment may extend over months or years. Increment I provides the initial deployment capability (a usable increment of capability called for in the ORD). There are two approaches to treatment of subsequent increments:

— The ORD includes a firm definition of full operational capability, as well as a firm definition of requirements to be satisfied by each increment, including an IOC date for each increment. In this case, each increment is baselined and the acquisition strategy defines each increment of capability and how it will be funded, developed, tested, produced, and operationally supported.

— The ORD includes a firm definition of the first increment but does not allocate to specific subsequent increments the remaining requirements that must be met to achieve full capability. In an evolutionary acquisition, the specific requirements for increment I are defined in the ORD, based on the user's increased understanding of the delivered capability, the evolving threat, and available technology, lead-time-away from beginning work on increment II, and so on, until full capability is achieved. Requirements that cannot be fulfilled during a specific increment development, with the approval of the requirements authority, may be delayed to the next increment development. The first increment, and each subsequent increment, is baselined in conjunction with the MDA authorizing work to proceed on that increment. The acquisition strategy defines the first increment of capability; how it will be funded, developed, tested, produced, and supported, the full operational capability the evolutionary acquisition is intended to satisfy; and the funding and schedule planned to achieve the full operational capability to the extent it can be

described. The strategy also defines the management approach to be used to define the requirements for each subsequent increment and the acquisition strategy applicable to each increment, including whether end items delivered under earlier increments will be retrofitted with later increment improvements.

(4) When a program has time-phased requirements and utilizes an evolutionary acquisition strategy, each increment has a set of parameters with thresholds and objectives specific to the increment. Each increment requires an independent system evaluation to support decision-makers.

(5) The T&E strategy for a program using an evolutionary acquisition strategy will remain consistent with the time-phased requirements in the ORD, AS, and APB. Planning for T&E will acknowledge the increment deliveries established in the acquisition strategy and baselined in the APB. The evaluation concept will be specific to each increment of the militarily useful capability planned.

b. System evaluation activities during the technology development phase. In this phase, the most promising system concepts are defined in broad objectives for cost, schedule, performance, software requirements, opportunities for tradeoffs, overall acquisition strategy, and T&E strategy. The CBTDEV prepares an ORD, which is derived from the Mission Needs Analysis, Requirements Analysis, Analysis of Alternatives, System Training Plan, and the System Threat Assessment Report (STAR). An ORD includes KPP and other operational capability requirements. The CBTDEV develops the COIC, while the MATDEV/PM develops the CTPs.

(1) During this phase, the system evaluation usually is in support of defining materiel concept solutions to satisfy the materiel need identified in the mission needs analysis, that is, the development of concepts of materiel, doctrine, training, leadership, and organization tied to the identified materiel solution. The CBTDEV, with support from ATEC or SMDC, may utilize the Battle Labs to execute warfighting experiments including concept experimentation programs (CEPs) and/or advanced warfighting experiments (AWEs) to aid in defining operational requirements that may also support the system evaluation. The CEP and AWE allow the CBTDEV to examine and resolve combat development, materiel concept, doctrinal, leadership, organization, and training issues. In support of a concept study, a technical feasibility test (TFT) or early user test (EUT) may be conducted to determine safety and feasibility of the components/subsystems if a concept has been chosen. (See chap 6.)

(2) When a program has been established, the T&E WIPT will craft a test and evaluation strategy to support pre-acquisition and early acquisition process activities. The test and evaluation strategy will address live testing and M&S, recognizing the respective risks, to evaluate system concepts against mission requirements. Consistent with the test and evaluation strategy, the system evaluator will develop a SEP. If a MS A occurs, the initial SEP will be the evaluation strategy. A SER is prepared to support approval of a new acquisition program at MS B.

(3) Application of M&S in this phase focuses on the mission need. Simulation can be used to demonstrate military utility of new tactics, technologies, and systems as well as to provide insights into human/machine interaction requirements. Engineering level models of new designs can provide estimates of system and subsystem performance to support higher level models such as engagement/combat models. If engineering level models are not yet available, reasoned representations of the desired system could be used in combat models to assess potential battlefield contribution and to formulate basic estimates of the key performance parameters and COI criteria required. An AoA is conducted during this phase and assesses relative cost and effectiveness of the alternative concepts.

(4) Specific evaluation activities conducted during the technology development phase may consist of the following—

— Participating in the ICT that develops the ORD.
— Participating in the T&E WIPT.
— Participating in the AoA efforts.
— Supporting the initial COIC development and approval process.
— Assisting in developing system characteristics and exit criteria.
— Developing the initial SEP consistent with the acquisition strategy.
— Participating in development, staffing, and approval of the TEMP.
— Identifying all required tests events, M&S activities, and other data collection events.
— Developing a SER in support of MS B and a SA at other times, when requested.
— For those weapons systems required by law to undergo LFT&E, develop a live fire strategy (see app J).

c. System evaluation activities during the system development and demonstration phase. Approval at MS B establishes a new acquisition program and concept baseline to include authorization for entry into the system development and demonstration phase.

(1) The key objective of this phase is to demonstrate that the technologies critical to the most promising concept can be incorporated into the system design.

(2) Tests conducted in this phase include an engineering DT (EDT) of prototypes, critical systems, subsystems, and components, contractor tests, EUT, LUT, AWE, and Joint Warfighter Interoperability Demonstration. An EDT assists in identifying and reducing design risk and indicates the degree to which new or emerging technologies pose a risk to the program. A production prove-out test (PPT) may be conducted at the subsystem level to provide data on safety,

achievability of technical parameters, and determination of technical risks. An EUT assesses the degree to which the selected design approach will operate in the intended operational environment. A LUT may be conducted to obtain data to support the system evaluation required for a LRIP decision. T&E will also be conducted to address doctrine, training, organization, leader development, materiel requirements, and logistics support aspects of the system, using surrogate systems if necessary. The use of M&S is strongly recommended in this phase to aid in the system evaluation. The system evaluation will address realistic program performance and suitability thresholds. See chapter 6 for a detailed discussion of testing.

(3) Simulation-based testing techniques can be applied to digital product descriptions, system models, and hardware components, to predict system performance in support of early feasibility tests and design trade-off analyses. Human-in-the-loop (HITL) simulators enable soldiers to interact with early system models. Computer generated test scenarios and forces, as well as synthetic stimulation of the system, can support system evaluation and testing by creating and enhancing realistic live test environments. Test results provide data for validation of system models and digital product descriptions, while M&S can identify and help resolve issues of high technical risk, requiring more focused testing. The system evaluator uses models to predict performance in areas that are impractical or impossible to test.

(4) Specific evaluation activities conducted during the system development and demonstration phase may consist of—

— Continued participation in the T&E WIPT.
— Supporting the COIC update and approval process.
— Supporting the ORD update and approval process.
— Participating in the update, staffing, and approval of the TEMP.
— Supporting AoA update efforts.
— Assisting in the development of exit criteria.
— Updating the SEP, as appropriate.
— Participating in the Simulation Support Plan (SSP) update.
— Planning all required data sources (for example, tests, M&S, and market surveys).
— Providing evaluation status at test readiness reviews, as appropriate.
— Developing a SER in support of a MS C, if conducted.
— Developing a SA to support intermediate decision reviews, when required.

d. System evaluation activities during production and deployment prior to the FRP. When conducted, MS C authorizes entry into LRIP and continuation into the production and deployment phase. The key objective of this phase is to achieve an operational capability that satisfies mission needs.

(1) During this phase, the system (including necessary training devices, threat simulators, test equipment, and computer resources) is engineered, integrated, tested, and evaluated to ensure the—

— System design is stable.
— System meets contract specifications and technical parameters.
— System is operationally effective, suitable, and survivable in its operational environment.
— System meets minimum essential user requirements.
— System is ready for production.
— System is supportable.
— System is ready for materiel release and deployment.

Testing is conducted on prototype, production-representative, or production systems. Both DTs and OTs are conducted during this phase. A PQT, conducted at system level using LRIP items if available, provides data on the reduction of design risks, achievement of the critical technical parameters, contractual compliance, the type classification determination, and validation of general and detailed specifications, standards, and drawings for use in production. The system design must be sufficiently mature to provide adequate support packages for testing and to ensure that the system is representative of the production system to enable valid assessments of the system. A LUT may be conducted to assess risk for selected operational requirements. LRIP items are delivered for use in the IOT that, for ACAT I and II programs, must be conducted prior to the FRP DR. See chapter 6 for a detailed discussion on testing.

(2) During this phase, a comprehensive full-up, system level LFT&E is required on covered systems before the FRP DR. See appendix J for a detailed discussion of the LFT&E strategy and document requirements.

(3) The iterative use of M&S and T&E supports the overall design and evolutionary development of a system. T&E uses M&S tools to provide mechanisms for planning, rehearsing, optimizing, and executing complex tests. The virtual proving ground (VPG) and other M&S capabilities provide synthetic environments and stimuli for more controllable, repeatable testing of system models and hardware throughout the acquisition cycle. Integration of simulation and testing provides a means for examining why the results of a physical test might deviate from pre-test predictions. Integrating M&S with testing also generates significantly more understanding of the interaction of the system with its environment than either M&S or testing alone.

(4) Specific evaluation activities conducted during the production and deployment phase prior to the FRP DR may

consist of—

— Continued participation in the T&E WIPT.
— Continued support to the COIC update and approval process for future increments.
— Supporting the ORD update and approval process, if appropriate.
— Participating in the update, staffing, and approval of the TEMP.
— Supporting AoA update efforts, if conducted.
— Assisting in the development of exit criteria, if appropriate.
— Updating the SEP.
— Participating in the SSP update.
— Planning all required tests, M&S activities, and other data collection events.
— Providing evaluation status at test readiness reviews, as appropriate.
— Developing a SER in support of the FRP DR.
— Developing a SA to support intermediate decision reviews, when required.

e. System evaluation activities during full-rate production and deployment. A favorable FRP DR represents approval to build the total expected buy (that is, to enter the full-rate production and deployment phase), to materiel release the system, to deploy/field the system, and to support the system while authorizing entry into the operations and support phase. The key objectives of this phase are to verify that the production item meets CTPs and contract specifications, determine the adequacy and timeliness of any corrective actions indicated by previous tests, and ensure that the item continues to meet operational needs.

(1) System evaluation is an integral part of the acceptance and introduction of system changes to improve the system, react to new threats, and reduce life-cycle costs. Production verification test (PVT) are system-level tests conducted to verify that the production item meets critical technical parameters and contract specifications, to determine the adequacy and timelines of any corrective action indicated by previous tests, and to validate manufacturer's facilities, procedures, and processes. A PVT will also provide a baseline for the test requirements in the technical data package for post-production testing. A follow-on operational test (FOT) may be necessary during or after production to refine the estimates made during IOT, provide data to assess changes, and verify that deficiencies in materiel, training, or concepts have been corrected. See chapter 6 for a detailed discussion on testing.

(2) Specific evaluation activities conducted during the full-rate production and deployment phase may consist of—

— Continued participation in the T&E WIPT.
— Planning all required tests.
— Providing evaluation status at test readiness reviews, as appropriate.
— Participating in the SSP update.
— Developing a SER, when requested.
— Developing a SA to support reviews (that is, materiel release).

f. System evaluation activities during the operations and support phase. The objectives of this phase are to execute a support program that meets operational support performance requirements and sustainment of systems in the most cost-effective manner. The sustainment program includes all elements necessary to maintain the readiness and operational capability of deployed systems. A SA may be developed as necessary to address changes that occur during this phase, such as, minor modifications and reprocurements as well as newly mandated DOD requirements.

g. System evaluation activities during evolutionary acquisition after the FRP decision. The system reenters the acquisition process at MS B for development of the subsequent increment(s). The program is defined in the AS, APB, and TEMP at the FRP DR.

5–5. System evaluation in support of other than new systems acquisition and development

a. System evaluation in support of system changes (see AR 750–10). A system change is a modification or upgrade to an existing system. It can be an alteration, conversion, or modernization of an end item that changes or improves the system's capabilities or fixes corrections to deficiencies after the FRP DR. For purposes of this document, the term "modification" will be used when the system is still in production and an "upgrade" will be used when the system is out of production (see AR 73–1). T&E is conducted to ensure that the modification or upgrade achieves the desired effect based upon performance, reliability, safety, or system logistical characteristics.

(1) *Modifications*. Any modification that is of sufficient cost and complexity that it could qualify as a major defense acquisition program (MDAP) or major automated information system (MAIS) will be a considered for management purposes as a separate acquisition effort. Modifications that do not cross the MDAP or MAIS threshold will be considered part of the program being modified (original program), if the program is still in production. If the program is out of production, the modification will be considered a separate acquisition effort. In either case, all modifications must undergo a system evaluation and most will require some level of testing to gather the requisite data.

(a) The T&E strategy for a modification will vary depending on whether the modification is considered to have significant operational impact, some operational impact, or no operational impact. The CBTDEV/FP is responsible for

determining whether a system change has operational impact, in consultation with the MATDEV/PM and system evaluator. The checklist at figure 5–1 will aid in determining which operational impact classification applies. For those modifications with operational impact, the system evaluator must draw upon military expertise, system acquisition knowledge, and current Army policy when developing the T&E strategy in consultation with the T&E WIPT.

(b) A modification that is in response to a new or revised operational requirement or that is intended to fill an existing operational requirement is considered to have significant operational impact. For materiel systems, this would normally result in the development of a T&E strategy, formation of a T&E WIPT, and update to the system TEMP.

(c) A modification that has some operational impact typically impacts mission logistics. Such modifications require a T&E strategy developed within the T&E WIPT even though the system change does not respond to an existing or updated operational requirement.

(d) If a modification has no operational impact, then the procuring command will determine the T&E actions necessary to support the decision. Such modifications do not respond to existing or changing operational requirements.

(e) As a general rule, the system evaluation will require testing. If there is any modification in the operational performance envelope, the system evaluation may require both DT and OT. If there is no operational impact, normally DT data will satisfy the system evaluator's needs. The T&E requirements are developed in coordination with the T&E WIPT and documented in the system's TEMP.

(2) *Upgrades.* In an evolutionary acquisition, the ultimate capability delivered to the user is divided into two or more increments, with increasing increments of capability. Increment I provides the initial deployment capability (a usable capability called for in the ORD). The ORD includes a firm definition of initial and full operational capability, as well as a firm definition of time-phased requirements to be satisfied by each increment. The T&E strategy must address the requirements for each increment. Upgrades, when planned or known, should be identified in the TEMP.

b. System evaluation in support of commercial items and non-developmental items (NDIs). Commercial items and NDIs provide a preferred alternative to a full system developmental program. If the market surveillance reveals an item that has a high probability of meeting the user's requirements and is cost effective across the life cycle, the potential item is investigated. Depending on the item's technical maturity and its ability to satisfy stated entrance criteria (such as, minimum accomplishments required to be completed prior to entry into the next phase), the commercial item or NDI may enter system acquisition at the FRP DR.

(1) *Commercial item and NDI categories.* There are two general categories of commercial items and NDIs and a third level of effort not designated as a separate category.

(a) A commercial item and NDI that fully meet the user's needs without modification may enter the acquisition model during the production and deployment phase. The FRP DR verifies the sufficiency of the item against the requirement and initiates type classification with reduced milestone decision documentation. This category consists of off-the-shelf items (for example, commercial, foreign, or other Services) that will be used in the same environment for which they were designed and will require no modification.

(b) A commercial item or NDI requiring minor modification to an off-the-shelf item may involve an abbreviated system development and demonstration phase to address necessary modifications. Here, limited testing may be required to verify the impact of the modifications on performance and reliability. This approach may require a MS C decision to enter into production or procurement if the system is a non-major program that does not require LRIP. This category consists of off-the-shelf items to be used in an environment different from that for which designed or that requires military ruggedization.

(c) The integration of a commercial item and/or NDI components into larger parent systems, both developmental and non-developmental is encouraged. The integration of commercial item or NDI components and systems resulting in a new system can be designated as a commercial item or NDI, as applicable. This category is focused on integration or assemblage of existing proven commercial components (commercial part integration).

(2) *Consideration standard.* To be considered as commercial item or NDI, any integration effort should involve only minor modifications to each commercial item or NDI component or subsystem to achieve successful integration. When pursued as a commercial item or NDI strategy, integration of components and subsystems requires an early and realistic assessment of the size of the integration effort and the associated risks. Because commercial items and NDI integration results in an essentially new system, focused risk management is essential throughout the acquisition process and increased requirements for T&E over the more classic forms of commercial items and NDIs are involved.

(3) *Market surveys and investigations.* Market investigations in support of commercial components/items may require a system evaluation, possibly with appropriate testing, to support development and updates to the system specification. The MATDEV involves the system evaluator in the development of the survey/investigation questionnaire to ensure that all required data are collected.

(4) *Steps leading to the SER for commercial items and NDIs.* A T&E WIPT is formed, a TEMP developed, and system evaluations are conducted. Each system evaluation makes maximum use of all existing data (including M&S, results of market surveys/investigations, and contractor data). The system evaluation must address the same issues as would be addressed for a full developmental program. A SEP is prepared to document specific data requirements and sources. Testing may be required to verify achievement of CTPs and operational effectiveness, suitability, and survivability. A SER will be developed to support the acquisition decision.

SYSTEM CHANGE CLASSIFICATION CHECKLIST

1. IS THIS SYSTEM CHANGE IN RESPONSE TO A NEW OR REVISED OPERATIONAL REQUIREMENT?
   IF "YES" - SYSTEM CHANGE WITH SIGNIFICANT OPERATIONAL IMPACT
   IF "NO" - GO TO QUESTION 2

2. IS THE SYSTEM CHANGE AN ADDITIONAL BLOCK IN AN EVOLUTIONARY ACQUISITION APPROACH LISTED IN THE CURRENT APPROVED ACQUISITION STRATEGY FOR THE PURPOSE OF ACHIEVING EXISTING OPERATIONAL REQUIREMENTS?
   IF "YES" - SYSTEM CHANGE WITH SIGNIFICANT OPERATIONAL IMPACT
   IF "NO" - GO TO QUESTION 3

3. DOES THIS SYSTEM CHANGE AFFECT SYSTEM OPERATIONAL CHARACTERISTICS, PERFORMANCE OR TACTICAL EMPLOYMENT, AND LOGISTICS SUPPORT BY THE USER?
   IF "YES" OR "NOT SURE" - GO TO QUESTION 3A
   IF "NO" - SYSTEM HAS NO OPERATIONAL IMPACT
   (GO TO QUESTION 4)

3A. BASED ON COORDINATION WITH USER REPRESENTATIVE, IS A NEW OR REVISED OPERATIONAL REQUIREMENT NEEDED?
   IF "YES" - SYSTEM CHANGE WITH SIGNIFICANT OPERATIONAL IMPACT
   IF "NO" - GO TO QUESTION 3B

3B. BASED ON COORDINATION WITH USER REPRESENTATIVE, DOES THE SYSTEM CHANGE HAVE OPERATIONAL IMPACT?
   IF "YES" - SYSTEM CHANGE WITH OPERATIONAL IMPACT
   IF "NO" - SYSTEM HAS NO OPERATIONAL IMPACT
   (GO TO QUESTION 4)

4. DOES THIS SYSTEM CHANGE SIGNIFICANTLY ALTER THE CONFIGURATION OF THE SYSTEM OR END ITEM IN ANY OF THE FOLLOWING AREAS?
   - TECHNICAL MANUALS
   - TMDE OR TEST PROGRAM SETS
   - SPECIAL TOOL SETS
   - TRAINING AND TRAINING DEVICES
   - RAM CHARACTERISTICS
   - TECHNICAL SURVIVABILITY, VULNERABILITY, OR LETHALITY CHARACTERISTICS
   - HUMAN FACTORS OR SAFETY CHARACTERISTICS
   - NEW OR NOT FULLY DEVELOPED TECHNOLOGY EMPLOYED
   - INTEROPERABILITY
   - MULTISERVICE IMPACT

   IF "YES" - SYSTEM WITH SIGNIFICANT TECHNICAL CHANGE
   IF "NO" - SYSTEM WITH OTHER TECHNICAL CHANGES ONLY

Figure 5–1. System change classification checklist

c. System evaluation in support of reprocurements (see AR 73–1, para 3–5, and DA Pam 70–3). Reprocurement of an item is authorized when a continuing need based on an existing or updated performance specification or purchase description from the last procurement has been identified and validated by the CBTDEV. If it is determined that a change in the ORD requirements is needed, the program will be treated like a system change program from a system evaluation standpoint. If the results of the review indicate that no change in the ORD requirements is warranted, the required evaluation and supporting test events can be greatly simplified. In this case, the PVT normally satisfies the system evaluation requirements to ensure compliance with the specification.

(1) System evaluation requirements vary depending on the degree of configuration stability and whether the reprocurement is—

(a) A commercial item, NDI, or a military standard item (a Government controlled technical data package).

(b) An item from a contractor different from the original item contractor.

(c) An item with a significant break in procurement (more than 2 years).

(2) System evaluation (including an analysis of logistics and training impact) may be required to support a MS decision if market investigations reveal that a commercial item previously procured is no longer available and significant configuration changes or technology advances have occurred that may result in a new acquisition strategy. Market investigations supporting such reprocurements may include necessary testing to support updates to the system specifications.

d. System evaluation in support of experiments and demonstrations. A system evaluation strategy should be developed to support Army experiments and demonstrations. (See AR 73–1, para 6–4). These are pre-acquisition efforts that may allow accelerated entry into the systems acquisition process.

(1) *Advanced technology demonstrations.* Advanced technology demonstrations (ATDs) allow the warfighter to explore military utility, affordability, and potential of technologies to support warfighting concepts.

(a) The evaluation strategy for an ATD will include experiments, demonstrations, and tests, as appropriate, documented using the TEMP format, tailored as appropriate.

(b) Formal T&E WIPTs are not required. The T&E documents do not require formal staffing or approval and are maintained by the program sponsor.

(c) System acquisition programs with approved TEMPs that have been redesignated as an ATD will continue to maintain TEMPs. The TEMP will reside and be maintained by the MATDEV. If a program is directed to reenter the formal acquisition process, the MATDEV will follow the formal policy and procedures in obtaining TEMP approval by the appropriate approval authority (see chap 3).

(2) *Advanced concept technology demonstrations.* Advanced concept technology demonstrations (ACTDs) are sponsored by OSD. Being user oriented and dominated, ACTDs provide a mechanism for intense involvement of the warfighter while incorporation of technology into a warfighting system is still at the informal stage.

(a) The system evaluation strategy for an ACTD will include experiments, demonstrations, and tests, as appropriate, documented using the TEMP format. Formal T&E WIPTs are not required. The T&E documents do not require formal staffing or approval and are maintained by the program sponsor.

(b) System acquisition programs with approved TEMPs that have been redesignated as an ACTD will continue to maintain TEMPs. The TEMP will reside and be maintained by the MATDEV. If a program is directed to reenter the formal systems acquisition process, the MATDEV will follow the formal policy and procedures in obtaining TEMP approval by the appropriate approval authority (see chap 3).

(3) *Warfighting experiments.* Warfighting experiments provide data and insights in support of the requirements determination process, force development process, and technology transition process. They provide information to evaluate major increases in warfighting capability. Although experiments are not designed as rigorous tests to support systems acquisition decision reviews, they generally contribute data to system evaluations, under CE, and should reduce the requirements for tests, especially in the early systems acquisition phases. Warfighting experiments include—

(a) Advanced warfighting experiment. A single AWE normally includes several technologies, materiel concepts, and systems in various stages of acquisition. Where possible, data collected during AWEs will be used to reduce operational test requirements.

(b) Concept experimentation program. A CEP is made up of discrete experiment events that investigate materiel concepts or warfighting ideas. Planning and execution of each CEP experiment is patterned after the T&E of systems in the acquisition model with as much scientific rigor as practical.

(4) *Force development test and/or experimentation.* The force development test and/or experimentation (FDT/E) supports the force development process by examining the effectiveness of existing or proposed concepts or products of DOTLPF. The FDT/E may be a stand-alone effort or it may be related to, or combined with, operational testing and should be documented in the TEMP. If conducted in lieu of an EUT, the results are included in the system evaluation. Data from the FDT/E will assist in determining essential and desirable system capabilities or characteristics. See chapter 6 for a detailed discussion on testing.

e. System evaluation in support of limited procurement. Limited procurement (LP) type classification is used when a materiel item is required for special use for a limited time. The specified limited quantity for the LP item will be procured without intent of additional procurement of the item under this classification. The LP type classification is used to meet urgent operational requirements that cannot be satisfied by an item type classified as standard.

(1) Criteria for LP type classification of an item required for urgent operational use will include the following:

(a) Existence of an urgent operational requirement substantiated by the using command representative and by the CBTDEV or HQDA.

(b) Determination that there is no type classified item that fully satisfies the requirement.

(c) Sufficient definition of the military characteristics of the item in materiel requirements documents to allow subsequent evaluation of the item.

(d) Demonstration that the proposed item does not qualify for standard TC and offers no more than a moderate risk.

(e) Determination that the proposed item can be economically maintained and logistically supported in the geographic area and timeframe for which the type classification is valid.

(2) Type classification of LP will not be used solely to avoid the acquisition process or to avoid T&E.

(3) Not later than 6 months following delivery of the initial shipment of the LP item, the user or requester of the item will collect data and provide an operational field evaluation statement to the PM or mission assignee agency. Information copies will be provided to HQDA (ATTN: SALT–RPP), TRADOC, AMSAA, and ATEC (AEC).

(4) System evaluation activities include—

(a) Preparing a SEP.

(b) Assisting the CBTDEV/FP in developing the ORD and COIC.

(c) Determining the need for DT, a quick reaction LUT, or other data collection events.

(d) Providing a SA to support LP type classification of the system based on program documentation, available test results, M&S, and other data collection events.

(e) Providing a SA to support materiel release under LP.

f. System evaluation in support of foreign comparative testing. The program for foreign comparative testing (FCT) generally fits into the Army acquisition cycle as part of the normal evaluation process of NDI. The FCT process is dependent on a developed foreign item, user interest, a valid requirement, good procurement potential, and a successful evaluation. (See AR 73–1, para 3–10.) See chapter 6 for a detailed discussion on testing.

(1) *FCT procedures.* After an item has met all criteria of the DOD FCT and nomination has been approved, a SEP will be prepared. Foreign and contractor data will be used to the maximum extent possible to satisfy the system evaluation requirements. If sufficient data are not available, test items will be obtained from the foreign county by way of loan, lease, or purchase, whichever is most advantageous to the Army and agreed to by the foreign country.

(2) *FCT reporting.* The Army FCT Executive Agent provides oversight of all FCT projects, and all plans and reports will be provided through the FCT Executive Agent.

Section II
Requirements Translation

5–6. Overview of requirements

a. The CBTDEV develops the operational requirements for new tactical systems or changes to existing tactical systems. Functional proponents develop operational requirements for new non-tactical C4/IT systems and changes to non-tactical C4/IT systems. A system evaluation strategy development begins during the requirements development process to ensure that system requirements are stated in clear, concise, and where appropriate, measurable operational terms. For materiel and tactical C4I/IT systems, the system evaluators participate in the development of operational requirements (that is, MNS, CRD, and ORD) through Integrated Concept Teams (ICT) (AR 71–9). The focus of participation is understanding the need and operational requirements and ensuring the requirements stated in CRD and ORD can be evaluated and answered.

b. In order to develop a sound T&E strategy, the system evaluator and testers must ensure that inconsistencies in the specification of requirements are resolved through their review of each requirements document (for example, MNS, CRD, and ORD). This review and a review of the system specification and the RFP will determine how to best support the strategy and to justify any need for changes to milestones or events.

5–7. Translating requirements

The proper interpretation of user requirements and the subsequent translation of the broad operational capability needs into system-specific operational requirements, to system performance specifications, to evaluation issues, and then to testing issues/parameters are the first steps in developing a T&E program.

a. Development of contractual documents. The MATDEV generates the contractual documents. Because these contractual documents must be legally exacting and enforceable as well as technically complete, they are usually more voluminous and quite different from the corresponding operational requirements document. The testers and system evaluator must be involved in the development of these documents (that is, the RFP and related contractual documents such as the system and development specifications) throughout the review process. The T&E WIPT must review section 3 of the system specifications to ensure the proper criteria are reflected and the requirements are measurable and testable. The T&E WIPT may be requested to assist in generating the test methods and procedures contained in section 4 of the system specifications. If a Statement of Objectives is used in the RFP, then the T&E WIPT should review the contractor-generated system specification.

b. Confirmation of the transition process. When the contractor receives the contractual document containing these requirements, there is another translation process. This is the actual fabrication of an end product intended to meet not only the technically exacting specifications of the contract but also the APB requirements. Test data provide the MATDEV, the system evaluator, and the decision-maker with information on the contractor's success at meeting the performance standards and establish the safety parameters for testing. In a technical sense, the process is a feedback loop that measures what was produced by the contractor against what was a requirement under the contract. This

process is important because it allows the MATDEV to replicate and correct/enhance the product when problems are revealed. It also confirms that the product being produced is acceptable.

5–8. Overview of the Operational Requirements Document

a. General description of operational capability. The general description section of the ORD identifies the statement of need, describes the overall mission area in terms of the Army Universal Task List (AUTL) (see FM 7–15), identifies linkages to CRD, describes the proposed system, summarizes supporting analyses, and introduces time-phased requirements so evolutionary acquisition can be applied. Perhaps the most significant of these is the Operational and Organizational Description provided in the system description. This operations oriented description links with the future concepts and defines where and how the system fits on the future battlefield and its anticipated contributions to future operations. As such the description serves as underpinning for the remainder of the ORD.

b. Capabilities required. The capabilities required section of the ORD provides the required operational capabilities, including parameters with threshold and objective values, applicable increments, and rationale for each parameter and value. Four sections of requirements apply: (1) system performance, (2) information exchange requirements (IERs), (3) logistics and readiness, and (4) environmental, safety, occupational health, and other system characteristics.

c. Key performance parameters. All system ORDs have key performance parameters (KPPs), which are those system capabilities considered essential for mission accomplishment. There are only a few KPPs that are roll-ups of other ORD capabilities. Not achieving a KPP threshold can be cause for a concept or system to be reevaluated and a program to be reassessed or terminated (that is, a FRP decision "show stopper").

d. Analysis of alternatives. The Analysis of Alternatives (AoA) is a rigorous, quantitative analysis, conducted by TRADOC, designed to assess multiple program alternatives along the lines of cost, operational effectiveness, and technical risk, as well as the tradeoffs between these elements. The findings from the AoA provide the analytic underpinnings for development of the ORD and refinements to the ORD KPPs. A list of supporting analyses, including AoA results, is attached to the ORD. This list includes a short description summary of the analyses used to develop the ORD and a synopsis of key pertinent results.

e. Program support, force structure, schedule, and program affordability constraint requirements. These sections of the ORD identify various system and program objectives and constraints applicable to achieving the required operational capabilities.

f. Attachments. Operational Mode Summary/Mission Profile (OMS/MP) and the SSP are attached to the ORD.

5–9. Development of evaluation issues

a. Evaluation issues. Evaluation issues consist of the COIC, developed by the CBTDEV/FP, and the Additional Issues (AIs), developed by the system evaluator, to ensure that a comprehensive plan for addressing a system's operational effectiveness, suitability, and survivability.

b. Critical operational issues and criteria. The COIC are derived from the operational requirement and reflect the minimum essential operational concerns and standards requiring answers during the system evaluation. Approved COIC are used to determine the scope, emphasis, and intensity of the T&E effort. This determination is the basis for the resources (such as, personnel, time, facilities, equipment, instrumentation, and funds) that must be committed to obtain the data to answer the issues and evaluate the degree to which the criteria are met. Detailed guidance for preparation, coordination, and approval of the COIC statement is provided in chapter 4 and appendix E.

c. Additional issues. AIs are evaluation focus areas developed by the system evaluator to supplement and complement the COIC. They are developed for those aspects of the system not covered by the COIs. Each AI set includes statement of the issue, scope, and measures. The resources necessary to address these AIs, if additional to the resources for the COIC, should be identified in the TEMP. For a more detailed discussion of AI in system evaluation, see paragraph 5–15.

d. Measures of effectiveness and measures of performance. The COIC and AIs define high-level evaluation issues for which the system evaluator develops the measures of effectiveness (MOEs) and measures of performance (MOPs). The MOEs/MOPs are used to design test events so data collected are sufficient to address all the different ways in which a requirement may have been interpreted. The evaluation issues and MOEs/MOPs are examined to ensure that each and every requirement is covered by a COI or AI and by a MOE/MOP. The end product is a consistent, fully justified set of evaluation issues that form the foundation for the SEP. See paragraph 5–22 for details regarding the process of developing MOEs and MOPs.

5–10. Critical technical parameters

Critical technical parameters (CTPs) are parameters that must be met. They are developed by the MATDEV, in conjunction with the system evaluator and CBTDEV, with input from other T&E WIPT members as required. The CTPs are listed in matrix format with accompanying objectives and thresholds in Part I of the TEMP (see app D).

a. Each CTP has measurable objectives and thresholds to be evaluated. The parameters are derived from the ORD and included in the system specifications/contract, the system characteristics (including software maturity and performance measures), and the technical performance measures. CTPs establish a relationship between the operational

requirements and testing to be performed and evaluated during acquisition. CTPs are evaluated using data obtained through testing, surveys, studies, M&S, or other analytical means.

b. Part I of the TEMP includes the specific CTPs that the MDA has designated as exit criteria and that must be confirmed in each phase of testing. To ensure a smooth transition of the system to the initial operational test and evaluation (IOT&E), the CTPs should be linked to the COI (see chap 4).

c. The following areas should be considered when applicable: system performance, physical attributes, security attributes, RAM, system safety, transportability, health hazards, natural environmental or climatic effects, logistic supportability, software reliability and maintainability, compatibility and interoperability, survivability, including conventional ballistic vulnerability, nuclear hardness and survivability, electromagnetic environmental effects, directed energy vulnerability, chemical, biological, radiological vulnerability, electronic warfare, countermeasures, counter-countermeasures, training, vulnerability, and lethality.

d. Noncritical technical parameters are parameters that do not have to be met for a system to continue to be acquired. They are developed by the PM/MATDEV and included in the system specifications and program documentation. The system evaluator may develop noncritical technical parameters for the completeness of the system evaluation or by regulatory guidance. Without inclusion in the contract, the contractor may not be held accountable for these parameters. Noncritical parameters may become critical as the system evolves.

Section III
System Evaluation Planning Process

5–11. System evaluation strategy overview

The system evaluation strategy defines the evaluation support to be provided to the systems acquisition process and identifies the necessary test, model, simulation, and analytic events needed to support the system evaluation process. To develop the system evaluation strategy, the system evaluator, in coordination with the T&E WIPT, must—

— Review requirements documents and the COIC.
— Address CTPs, AIs, and measures for evaluation.
— Identify the data requirements and data-generating events.
— Coordinate with the user and acquisition community.
— Provide the system evaluation requirements and objectives for the TEMP.
— Develop the SEP, to include test entrance criteria as appropriate.
— Provide system evaluation M&S requirements to the SSP.

a. All systems are developed to allow soldiers, units, and commanders to conduct mission-level tasks and, thus, provide one or more operational capabilities. The system evaluation effort begins by defining what it means to be mission effective, suitable, and survivable for a specified unit receiving the system.

(1) Mission effectiveness pertains to the capability of the operational unit (that is, military units and soldiers) to accomplish the critical mission tasks required to perform its assigned missions, as described in the MNS and ORD. Capability is the ability of typical operators and maintainers to accomplish needed critical mission tasks.

(2) Mission suitability pertains to the design characteristics (such as, MANPRINT, RAM, integrated logistics, and tactical interoperability) needed to enable and sustain critical mission task accomplishment. Sustainability addresses the ability of the system to achieve and remain in an operable and committable state (that is, operational availability) during the course of conducting its mission(s).

(3) Mission survivability addresses the design characteristics needed to enable systems and operational units to avoid, evade, and withstand the effects of the threat in order to increase mission effectiveness.

b. As an extension to the system evaluation strategy, the SEP identifies important areas of study, prescribed measurements, and the data and informational needs of the system evaluation effort. These data gathering needs are identified in test plans over a variety of test events as discussed in chapter 6. The SEP shapes the relevant topics to be evaluated.

5–12. Development of the system evaluation strategy

a. The system evaluation strategy constructs a road map of the CE effort for the systems acquisition process (such as, from concept to fielding). It focuses on both mission-level and system-level. The mission focus directly relates to the final determination of mission effectiveness, suitability, and survivability. The system evaluation strategy outlines the mission(s) and mission task(s) that will be studied and evaluated prior to LRIP, FRP, materiel release, and fielding. The complement to the mission-oriented portion of the system evaluation strategy is the system functional capability. System functional capabilities will be identified, studied, and assessed throughout the acquisition process. Linkage between the system functional capability developed by the PM and the supported mission task conducted by soldiers must be clear. The system evaluation strategy outlines this mission-system linkage, and it is detailed in the SEP. The system evaluation strategy is developed in parallel with the acquisition strategy (see AR 70–1) and is developed as early in the systems acquisition process as possible. All aspects of performance, safety, and operational effectiveness,

suitability, and survivability must be evaluated under realistic operational conditions. The iterative process of testing changes the emphasis of the system evaluations and assessments as the system evolves through design goals and moves towards IOT and the FRP DR. As appropriate, the system evaluation will reflect the system in a realistic environment with typical users, support, threat personnel, and equipment.

b. The TEMP (see chap 3) documents the T&E strategy, including the separate T&E cycles to be performed during the development and acquisition of the system. The system evaluation strategy is developed based on requirements identified in the ORD and the COIC (see chap 4), as well as other supporting documents (such as, AoA, SSP, threat assessments, and mission area strategies under development). The overall T&E strategy considers combined or integrated testing and M&S to save resources and time and as cost-effective methods for overcoming limitations and constraints upon test and evaluation. M&S may be used to achieve adequate test realism, support more economical, timely, and controlled test execution, and contribute to a more sufficiently comprehensive system evaluation.

c. The system evaluator develops the SEP in concert with development of the TEMP. The SEP is a system-level document that provides the integrated T&E strategy (such as, the system evaluation strategy and the test/simulation execution strategy) to be used throughout the system's acquisition life cycle. While consistent with the TEMP, the SEP provides the additional detail to ensure the developmental, operational, and live-fire testing, including M&S and other events, are sufficient to satisfy the evaluation issues. If significant program changes occur, the SEP is updated or revised prior to milestone decision points.

d. The major questions to be answered become the evaluation issues. These issues include all the COI and supporting criteria and any AI developed to address areas covered by CTPs, KPPs, or other requirements. The system evaluator, in coordination with the testers, determines what data are required to answer the issues and identifies the supporting events as well as the conditions under which each event must be performed to ensure the data are adequate.

e. DODI 5000.2 requires that all projects that undergo a MS A decision to have a test and evaluation strategy. The Service component approved test and evaluation strategy is to be submitted to OSD for approval. It primarily addresses M&S, identifying and managing the associated risk, and how to evaluate systems against mission requirements.

(1) There is no mandatory format for this early test and evaluation strategy. Because pre-MS A systems will have neither an ORD nor COIs, the early test and evaluation strategy will be based on the MNS. When an early test and evaluation strategy is developed, it will become the basis for the T&E strategy in the TEMP.

(2) The early test and evaluation strategy will follow the same approval process as the TEMP.

(3) The early evaluation strategy is jointly developed by OSD, ATEC, MATDEV, and CBTDEV.

5–13. Test and evaluation reviews

Reviews are conducted periodically to assess progress and readiness to proceed to the next step in the T&E process.

a. Early strategy review. An early strategy review (ESR) is held to review and approve the proposed system evaluation strategy that will be documented in the SEP. The approval authority is briefed on the overall methodology, including the supporting BCM, AIs, and the T&E input to the TEMP. The approved system evaluation strategy is the basis for developing the supporting test and/or simulation execution strategy (T/SES). Concurrently, the testers and system evaluator are working within the T&E WIPT to provide draft input to the TEMP.

b. Concept in-process review. A concept in-process review (CIPR) is held to brief the approval authority on the development of the T/SES. Approval of the pattern of analysis (POA) and the DSM is also obtained. The ESR and CIPR may be combined.

c. Test readiness review. Test readiness reviews (TRRs) are held to assess overall readiness of the system for test. For detailed information on TRRs, see chapter 6.

5–14. Threat considerations in system evaluation

a. Evaluation base. The system evaluation must be based on testing that accurately represents the threat projected to exist at post-initial operational capability (IOC). The post-IOC year will be used as the basis to determine threat projection requirements. The threat integrator member of the T&E WIPT will review threat support to testing as part of the Threat Coordinating Group process.

(1) System evaluation planning must reflect the threat against a supporting system or a system that is interoperating with the system under test (such as a computer system dependent on a separate communications system).

(2) If the threat (as described in the STAR) or if any of the threat systems cannot be fully addressed in testing, the limitations, as well as the testers' plan to compensate for the limitations, must be included in the TEMP. A test's threat limitations must be addressed in sufficient detail to provide an understanding of their impact on the test and thereby the impact on providing data and information with which to support the system evaluation.

(3) The SER will address the approved threat of the requirements document, as well as the threat projected to exist post-IOC as described in the STAR. The SER will separately address each element of the approved threat, as well as the approved threat in existence at the last milestone review, if different.

(4) As much as practical, actual threat systems will be used as targets or simulators during testing. When actual threat systems are not available, only validated and accredited threat simulators that have been accredited in accordance

with this pamphlet will be authorized for use to support testing. Requirements for threat systems, simulators, and targets are to be coordinated with the PM ITTS.

(5) Transitioning threat intelligence assessments into instrumented field test arrays adequate to test a developmental system within the context of the COIC, exit criteria, and technical characteristics, is one of the more demanding challenges confronting testers and the system evaluator. Given resource constraints that preclude representation of a threat force with complete fidelity, testers and the system evaluator must be persistent and resourceful in seeking means to offset threat portrayal shortfalls to minimize their impacts as potential test limitations with emphasis on those aspects directly related to the COIC and AIs.

(6) Application of M&S techniques should be considered as a means to offset the impacts of a test's threat limitations and assess the impacts of uncertainties that exist in the test data.

(7) Smoke and obscurants and laser vulnerability will be addressed as a part of all threat considerations for electromagnetic and optical systems.

b. Threat Coordinating Group. The system-specific Threat Coordinating Group is an integrating body composed of the Army's CBTDEV and MATDEV organizations, T&E organizations, and the intelligence community to coordinate the provision of timely, consistent, and approved threat intelligence support throughout the acquisition cycle of a system. The threat integrator establishes and chairs the Threat Coordinating Group as a subgroup of the T&E WIPT. For major and OSD T&E Oversight programs, the HQDA (DCS, G–2) Foreign Intelligence Director of Threat will establish the Threat Coordinating Group. For nonmajor programs, TRADOC or AMC, in coordination with one another, have this responsibility. The system-specific Threat Coordinating Group performs the following functions:

(1) Assist CBTDEV and MATDEV to articulate their intelligence requirements and facilitate resolution of issues related to threat.

(2) Review and coordinate approval of STARs and threat test support packages and threat portions of system program management documents, such as the MNS, ORD, and TEMPs.

(3) Coordinate review of models, scenarios, and analysis for correct application and interpretation of threat.

(4) Review and coordinate threat support to testing with the Threat subgroup of the T&E WIPT to include scenarios and use of scenarios, simulators, surrogates, and targets.

(5) Identify threat and/or threat support issues and determine responsibility for resolution.

c. Threat Accreditation Working Group. After the initial Threat Coordinating Group meeting, the Threat Accreditation Working Group should be convened. The Threat Accreditation Working Group is formed to accredit specific test application of threat simulators, targets, surrogates, and target arrays. See chapter 6 for details.

d. System Threat Assessment Report. The Defense Acquisition Guidebook encourages a system threat assessment be conducted to support program initiation. The System Threat Assessment Report (STAR) (see AR 381–11) fulfills this requirement. It is the basic threat document supporting system development for all acquisition programs. It is used to define the threat environment in which a developmental system must function throughout its life cycle, typically at IOC plus 10 years. TRADOC develops and coordinates the STAR for systems for which program initiation occurs before MS B. For all other program initiation points, the STAR is developed by the MATDEV, who updates it annually.

(1) The STAR is written, approved, and updated continuously throughout the system development life cycle.

(2) The STAR is required for all ACATs; however, level of approval authority differs for oversight and non-major programs.

(3) The STAR includes the critical intelligence categories. The categories represent the threat capability or threshold established by the MATDEV, changes to which could critically impact the effectiveness and survivability of the system.

e. Threat in the TEMP. Representations of threats used for T&E will be identified in the TEMP. Approval for their use, in accordance with AR 381–11, will be part of the TEMP coordination and approval process. The TEMP relates threat intelligence to test events, as depicted in the STAR/STA, in order to identify requirements for all categories of threat simulators/targets and simulations, and requires that threat system and simulator requirements be identified by type, number, and availability. Also required is a comparison with available projected threat systems or simulators and a statement that identifies major shortfalls. Target requirements are to be treated in a similar manner.

f. Issues and criteria. The COIC, defining acceptable standards of system performance, are formulated before the STAR. As a result, there may be differences between the threat outlined in the STAR and the threat considered in developing the CTPs and COIC/AI. This situation also can arise with the Threat TSP, which may require modification to accommodate evolving COIC or exit criteria and test planning.

g. Use of threat simulators and targets. Whenever possible, actual threat systems are used during operational testing to represent an enemy force, but resource limitations usually result in the use of replicas, threat simulators, and surrogates, the functional characteristics of which approximate those of actual threat systems. Threat simulators generally are more costly and sophisticated than targets and are intended for reuse, and targets are devices that are designed to be engaged and destroyed.

h. Project Manager for Instrumentation, Targets, and Threat Simulators. The PM for Instrumentation, Targets, and Threat Simulators (PM ITTS) has the responsibility for the engineering, development, acquisition, fielding, life cycle

management, and capability accounting of Army targets, threat simulators, and major range instrumentation for DT and OT. The PM ITTS is the executive agent for both the ATS and Army Targets Programs.

i. Threat simulator and target validation. Validation is the process used to determine whether a threat simulator or target provides a sufficiently realistic representation of a corresponding threat system to justify continuation of its development, use, or modification to restore or improve its capabilities to conform with current intelligence estimates.

(1) The PM ITTS determines when validation working groups (VWGs) are required, informs TEMA, and also participates in the meetings. TEMA determines whether a VWG will be chartered to manage the overall validation effort or that TEMA will chair a DA level VWG to conduct the validation effort.

(2) Validation is performed at key decision points during the life cycle of simulator or target: design specification review; Initial Operational Capability (acceptance); and operational (upon major modification) and periodically following acceptance for use in testing.

(3) The Initial Operational Capability report is approved by the Director, TEMA and is subsequently forwarded to DOT&E for final approval. After the MATDEV completes the Design System Review (DSR) report, the Threat subgroup to the T&E WIPT will review the report and provide concurrence/non-concurrence comments to the developer. In turn, the developer is required to submit a one-page letter DSR report to TEMA briefly highlighting the results of the Design System Review report and addressing any unresolved non-concurrences. The Operational Validation Report is completed by the system's developer/owner, which is submitted to TEMA for review/concurrence.

(4) PM ITTS chairs the DA VWG Planning Committee, which is the work group that does all of the extensive, real time planning for the DA VWG.

j. Organizational responsibilities. Because a number of organizations share responsibility for the complex and demanding task of integrating threat into T&E, AR 381–11 provides a detailed explanation of organizational responsibilities with respect to threat support. The process of integrating threat into T&E programs requires that DCS (G–3 and G–2), TEMA, AMC, TRADOC, ATEC, SMDC, and AMSAA coordinate closely and constantly throughout the acquisition process.

k. Required characteristics of threat support to T&E.

(1) *Consistency.* The threat environments applied to testing of developmental systems must be derived from a baseline of DA-approved intelligence products. Threat portrayals for DT and OT of a system, although tailored for each test, must remain compatible throughout testing.

(2) *Continuity.* The planned portrayal of threat must be evaluated at each phase in the T&E cycle to ensure that related shortfalls are identified in T&E documents as test limitations and their impacts on the validity of the test are assessed. Efforts to incorporate the most current threat intelligence in test planning and to upgrade the fidelity of planned threat portrayals must be continuous.

(3) *Timeliness.* Intelligence estimates of the threat, even though they may treat specific aspects of future threat forces capabilities with uncertainty due to intelligence "gaps," must be provided to developers and testers on a timely basis to meet prescribed planning milestones throughout the T&E cycle.

(4) *Tailoring.* Threat must be tailored to each test to ensure that the simulated battlefield environment is adequate to test the developmental system in the context of the IOC threat it must counter. In defining the threat for developers, testers, and evaluators, implications of incomplete intelligence must be identified to them in terms of "gaps" and uncertainties to allow early consideration of the application of automated M&S techniques necessary to integrate relevant threat intelligence uncertainties into T&E processes.

(5) *Comprehensiveness.* The threat against the total system must be described and include supporting systems or other interoperating systems, such as a computer system dependent on a separate communications system. Threat surrogates need to be approved by HQDA (DCS, G–2).

l. Lethality and survivability (see apps I and J).

(1) *Direct effect systems.* For those kinetic, chemical, and directed-energy weapons that have direct impacts against the threat force, effectiveness is measured in terms of lethality and survivability.

(2) *Indirect effects systems.* Other types of systems are designed to operate indirectly against threat systems by enhancing the lethality and/or survivability of a primary system, (for example, improving the mobility, C3, or intelligence support of a lethal system). While the operational effectiveness of indirect systems cannot be measured by the direct impact they have on the threat force, they can be measured by the extent to which they either multiply the lethality, or increase the survivability, of a primary (direct effect) system.

(3) *Combined effects systems.* Some indirect systems and subsystems (such as, communications and target acquisition), however, are subject to both lethal and non-lethal EW threats. Although testing may isolate and emphasize the EW threats against indirect systems, ultimately a determination must be made whether the indirect system measurably contributes to the operational effectiveness of either specific lethal systems or combat forces overall. These determinations are difficult and tenuous if indirect systems, such as intelligence systems, are evaluated against the threat of deception, or if EW systems are measured against enemy communications.

m. Threat M&S. Threat M&S should be considered as an adjunct to testing when developing the evaluation strategy. M&S can provide data when actual field testing is either infeasible or impractical due to factors of cost, test time length, unsuitability of maneuver space, terrain, weather, security considerations, safety, threat portrayal shortfalls,

restriction on use of the electromagnetic spectrum, and limited instrumentation affecting other test resources. See chapter 6 for details on using threat M&S in testing.

5–15. System evaluation issues and criteria

The SEP defines the plan for the system evaluation and supporting events. It provides specific detail down to the MOE and MOP level. The system evaluator prepares the SEP in coordination with the T&E WIPT. Issues are the concerns expressed as questions that provide focus for the system evaluation. Criteria are the standards, or measures, that when achieved answer the issues.

a. The issues include both the COIC (see chap 4), developed by the CBTDEV, and the AIs, developed by the system evaluator. Issues for evaluation cover all aspects of a system applicable to the evaluation of operational effectiveness, suitability, and survivability.

b. The AIs complement and supplement the COIC and are derived from the ORD, CTPs, KPPs, and other performance parameters. AIs address the total system requirements rather than just the critical elements. The system evaluator develops the AIs in coordination with the testers, CBTDEV, and other members of the T&E WIPT. It is important to develop and comprehensively review the AIs because they must address all required areas not addressed by the COIC.

c. The elements of an AI set are the issue statement, scope, and measures (or set of measures) associated with the issue. The conditions for examining and standards for measuring a comprehensive issue are contained in the scope. Each element contributes to the cohesiveness of a complete evaluation issue. It is re-emphasized that answers to an issue may be provided by one or more means.

d. See chapter 4 and appendix E for the details on COIC format and content.

e. Categories of system evaluation issues.

(1) *Mission performance issues.* Mission performance issues are those that deal with determining how well the system does what it is designed to do. Such issues normally address the major functions of the system (for example, detecting, identifying, and engaging aircraft, or receiving, processing, and relaying message traffic). Mission performance issues generally address system level functions and do not address component functions.

(2) *Survivability and vulnerability issues.* Survivability and vulnerability issues are those that deal with a system's likelihood of avoiding being rendered ineffective by enemy action while performing its mission. DT typically addresses the following factors: firepower (lethality), survivability (vulnerability), performance, safety, reliability, maintainability, durability, MANPRINT, ILS, and software. While OT measures may include the same areas as DT measures, they are from an operationally realistic environment and will normally include system signatures and exposure times, as appropriate. These measures determine ease of enemy engagement. See appendix I for a more detailed discussion of survivability and vulnerability.

(3) *Reliability, availability, and maintainability (RAM) issues.* These three elements may be broken out separately or in terms of only reliability and maintainability (R&M) when availability is not applicable. R&M will always address technical and operational aspects, whereas availability will only address operational aspects. See appendix K for definitions and a more detailed discussion of the RAM WIPT and the RAM Scoring Conference procedures.

(4) *Logistics supportability issues.* Logistics supportability issues deal with the impact of providing maintenance and operating support, as well as tactical automation support in both concepts and materiel. Maintenance support includes repair teams, procedures, the spare parts supply system, and materiel evacuation assets. Operating support must consider such expendable items as POL, air filters, rations, and ammunition. See appendix L for a more detailed discussion of ILS and logistics supportability.

(5) *MANPRINT and system safety issues (AR 602–2 and AR 385–16).* Throughout the acquisition process, MANPRINT will be a factor in all T&E planning. MANPRINT addresses human performance considerations as they apply to a system. MANPRINT has seven areas of interest (that is, domains) that are considered in developing the evaluation issues: Manpower, Personnel, Training, Human Factors Engineering, System Safety, Health Hazards, and Soldier Survivability. MANPRINT issues examine management and technical efforts to ensure total system effectiveness by posing the question—"Can typical soldiers, with the training given, perform these tasks to the standards under these conditions using this equipment?" See appendix M for a more detailed discussion of MANPRINT and appendix N for System Safety.

(6) *Means of employment issues.* Means of employment consists of organization, doctrine, and tactics. Organization evaluation issues deal with how people are distributed by position and what equipment would optimize the system's effectiveness in the context of its operating environment. Such issues also examine the organization of the maintenance and other support units that must interact with the system's unit. Doctrine issues investigate the adequacy of planned doctrine for the employment of the system. These issues must consider doctrinal aspects of the unit or organization that hosts the system, as well as those aspects of supporting and supported units to optimize the effectiveness.

(7) *Interoperability issues.* Interoperability involves the technical ability to "talk to" other systems and the operational ability to exchange information/data that enhances mission accomplishment and force effectiveness. Interoperability issues examine the extent to which a system interacts with or does not interfere with other systems on the

battlefield. The system is studied for its synergistic relationship in its operational environment. See appendix O for more details.

(8) *Transportability issues (see AR 70–44 and AR 70–47).* Transportability and deployability evaluation issues address the ability to move the system into a theater of operations and move it within the theater of operations consistent with the mission. These issues are sometimes considered as a separate, distinct element of operational suitability, rather than as a part of logistics supportability. Transportability issues may deal with airplane loading or internal and external helicopter loads. The examination must address not only the ability of aircraft to carry the load but also their availability (for example, numbers of carrier vehicles not otherwise committed). See appendix L for details.

(9) *Natural environmental testing issues.* Requirements documents include a statement of the areas or climatic conditions in which the system may be operated, stored, or transported. Systems under development are always tested in climatic chambers and usually undergo additional natural environmental tests to provide data on the synergistic effects of the climate. Type classification requirements include the completion of natural environmental testing in the basic climatic design type. Items designated specifically or primarily for use in extreme natural environments should successfully complete the extreme climatic tests for the specific areas of intended use. See appendix P for details.

(10) *Software issues.* Software considerations for battlefield automated systems, except for organization, doctrine, and transportability and deployability categories, must be made when forming the AIs. Although primarily found in mission performance functions, software extends to the remaining categories of system evaluation issues. Survivability and vulnerability issues, for example, may have a radar warning feature supported by software that warrants examination. TMDE is likely to be heavily software dependent. Each category should be examined to see if there is reason to include a software issue and criteria. Most software evaluations require some verification of the software's value and safety through testing. Software issues can involve Information Assurance (IA). See appendix Q for a detailed discussion of software issues.

5–16. System evaluation tools

Evaluation planning is an iterative process that requires formal and informal analyses of demonstrated or potential system performance to meet the stated mission-level and system-level requirements against a specified threat and operational environment. Techniques that have been proven effective in evaluation planning include: process analysis, design or engineering analysis, matrix analysis, and dendritic analysis.

a. Process analysis techniques. Process analysis techniques consist of thinking through how the system will be used in a variety of environments, threats, missions, and scenarios in order to understand the events, actions, situations, and results that are expected to occur. This technique aids in the identification and clarification of appropriate measures, test conditions, and data requirements.

b. Design or engineering analysis techniques. Design or engineering analysis techniques are used to examine all mechanical or functional operations that the system has been designed to perform. These techniques involve a systematic exploration of the system's hardware and software components, purpose, performance bounds, manpower and personnel considerations, known problem areas, and impact on other components. Exploration of the way a system operates compared to intended performance functions often identifies issues, measures, specific data, test events, and required instrumentation.

c. Matrix analysis techniques. Matrix analysis techniques are useful for analyzing any situation where two classifications must be cross-referenced. For example, a matrix of "types of data" versus "means of data collection" can reveal not only types of data having no planned means of collection but also redundant or backup collection systems. Matrix techniques are effective for tracing a system's operational requirements through contractual specification documents, as well as issues and criteria, to sources of individual data or specific test events.

d. Dendritic analysis techniques. Dendritic analysis techniques are an effective way of reviewing COI to determine the point where actual data requirements, test measurements, and modeling assumptions and predictions can be identified. Issues are successively broken down into sub-issues, measures, and data requirements in a root-like structure. In this approach, the objectives are used to clearly express the broad aspects of evaluation related to the COI and the overall purpose of the data. Measures are developed as subsets of the objectives and are designed to treat specific and addressable parts of the objectives.

5–17. Data sources for system evaluation

The continuous system evaluation strategy is developed to assess all aspects of a system's technical parameters and operational performance. Therefore, the system evaluator uses all credible sources of data to provide information relative to technical performance, qualification of components, compatibility, interoperability, survivability, vulnerability, lethality, transportability, RAM, manpower and personnel, safety, ILS, correction of deficiencies, accuracy of environmental documentation, and refinement of requirements. The system evaluation also provides information relative to doctrine, tactics, and training.

a. DT and OT. See chapter 6.

b. Foreign comparative testing. The objective of the FCT program is to reduce duplication in R&D and provide cost and performance advantages. See AR 73–1, paragraph 3–10.

c. Models and simulations (see para 5–21). The system evaluator determines availability of and the need for M&S analyses during development of the SEP.

d. Market investigation. The data collected during market investigation provide information on the ability of items to fill operational requirements.

e. Other military services, other U.S. agencies, foreign governments, and data collected by private industry. Use of existing data is highly encouraged to support the system evaluation. In the case of foreign governments, agreements may be in place or needed to support the exchange of such data.

f. Warfighting experiments. Warfighting experiments may consist of advanced warfighting experiments (AWE) or concept experimentation programs (CEP) that are conducted by battle labs, Army proponents, and Joint Forces Command to provide data in support of the requirements determination, the force development, and the technology transition processes. (See AR 73–1, para 6–4*g.*)

g. Force development test and/or experimentation. The FDT/E program examines the effectiveness of existing or proposed concepts or products of doctrine, training, leader developments, organization, and soldier development. (See AR 73–1, para 6–4*h.*)

h. Advanced concept technology demonstration and advanced technology demonstration. These demonstrations provide pre-acquisition data in support of warfighting concepts and should result in a more comprehensive requirements document. The system evaluator uses the data generated during these demonstrations if the technology being demonstrated results in an acquisition program. (See AR 73–1, para 6–4.)

5–18. Baseline Correlation Matrix

The Baseline Correlation Matrix (BCM) is a tool used to analytically structure all evaluation requirements for identification and documentation. The BCM presents a crosswalk of the requirements from all the applicable requirements documents and COI. The crosswalk provides the capability to analyze and compare requirements and assists in the identification and definition of AIs and measures. The BCM is used to ensure that the system requirements documents are consistent and to flag those cases where inconsistencies exist.

a. Spreadsheet format. The BCM spreadsheet format (see an example at table 5–1) shows requirements in the left column with source documents organized across the remaining columns. The resulting cells record the stated information as documented in the specific source document. This process provides for easy assessment of consistency of requirements and identifies areas that are not addressed but that are required for a comprehensive evaluation as additional issues. Technical and operational requirements are indexed to the evaluation issues in the left-most column and are traced through the requirement development process to the measures in the right-most column that will be gathered in testing. The measures are used to ensure the data collected are comprehensive enough to address all the different ways in which a requirement may have been stated. Entries should include the paragraph number from the source document and a summary of the capability, measure, and threshold when applicable. The BCM should include, but not be limited to, the following column headings if the applicable documents exist:

— System requirements categories.
— Mission Need Statement (MNS).
— Operational Requirements Document (ORD).
— Latest Analysis of Alternatives. Correlate the measures of effectiveness (MOE) with system issues and requirements if possible. Resolve inconsistencies.
— System specification or Request for Proposal (RFP) if the document details operational requirements. For NDI, the RFP and system specifications may be the primary requirements documents available.
— Critical Technical Parameters (CTPs).
— Critical Operational Issues (COIs).
— Additional Issues (AIs).
— System Training Plan (STRAP)
— System Safety Management Plan (SSMP)
— System MANPRINT Management Plan (SMMP).
— Computer Resource Management Plan (CRMP).
— Measures. The measures give an indication if the system requirements can be evaluated. If satisfactory measures cannot be defined, the system evaluator cannot evaluate the system requirement as stated.

Table 5–1
Sample baseline correlation matrix

System requirement	MNS	ORD	System specification	COIC	AI	S M M P	C R M P	MOE/MOP
1.0 Firepower	CAL must provide a high degree of protection from enemy aircraft raids.	2.3 CAL probability of kill=0.96 per enemy plane when raid size is < 20 planes.	1.2 CAL probability of kill=0.96 per enemy plane when raid size is < 20 planes.	1. Issue. Does the CAL provide an improved capability of kill enemy planes? 1.1 Criteria. CAL will have a probability of kill < when raid size is < 20 planes.	5. Issue. Does the CAL retain capability of kill in an EW environment? (No criteria)			1.1.1 Pk=#K/T#Tgts. #K=# enemy planes killed in given battle sequence T#Tgts=total # targets in given sequence. 5.1 Pk=(etc.) 5.2 Pk=(etc.)

		2.7 CAL must have a firing rate of 1 round per launcher every 5 seconds.	1.3 CAL must have a firing rate of 1 round per launcher every 3 seconds.	2. Issue. Does the CAL have an effective firing rate during a typical battle scenario?
				2.1 Criteria. CAL's firing rate of 1 round per launcher/5 sec.
								2.1.1 MTT Launcher Firing Rate=(Sum of DUREI)/(Sum of #U). DUREI=duration of engagement i.
								U=# launcher for launcher 1 in eng

2.0 Target Location	4.2 CAL must detect, identify, and engage targets with a high probability at a distance before threat aircraft can deliver ordnance.	3.1 CAL must detect target with probability 0.91 at a distance of < 2 miles.	2.5 CAL must detect target with probability 0.91 at a distance of < 2 miles.	3. Issue. Does the CAL accurately detect enemy targets in an operational environment? 3.1 Criteria. CAL will detect enemy target with probability < 0.91 when target is < 2 mi.				3.1.1 Pd=#D/T#Tgts. #D is # enemy planes detected in a given battle sequence. T#Tgts is total # targets available in a given battle sequence
		3.2 CAL operator must correctly identify target with 0.98 probability.	5.7.1 The CAL weapons sight will have a resolution of 0.3 milliradians.	4. Issue. Does CAL correctly identify targets in the field? 4.1 Criteria. CAL will correctly identify 98% of the targets it detects. 4.2 Criteria. (etc.)				4.1.1 Pi=#I/#D. #1 is #enemy planes correctly ID in a given battle sequence. #D is # enemy planes detected in a given battle sequence.

b. Development of the BCM is an evolutionary process. As requirements from each new baseline document are added, they are compared to the requirements already established in the BCM. By tracing the consistency of the requirements for wording, measures, units, and specific values, discrepancies are found at a time when their impact can easily be minimized. If an inconsistency, omission, or other change that is not directly traceable to an earlier requirement is noted, it must be justified or rectified. The issues for evaluation (such as, CTPs, COI, and AI) are examined to ensure that each is covered by an adequate set of measures. The end product is a consistent, fully justified set of operational measures that is a firm foundation for the system evaluation. The BCM is included as an appendix to the SEP. See paragraph 5–15 for a complete discussion of issues in a system evaluation.

c. Streamlining of the BCM is permitted for nonmajor programs. The system evaluator may consider combining the Data Source Matrix and the BCM, if appropriate and with the agreement of the T&E WIPT.

5–19. Data Source Matrix

The Data Source Matrix (DSM) identifies all supporting test and simulation events and allocates MOEs/MOPs to those events. The purpose is to provide a crosswalk of all measures to the identified data sources. The matrix is structured to show each issue, criteria, and supporting measure in the left three columns of the spreadsheet and each identified data source across the remaining columns. Measures are allocated to the most appropriate event for generation and collection of data. Each measure must have at least one primary data source. The DSM shows the contributions of each data source to the measures, enabling event planners to properly scope the requirements of the events. The DSM assists in identification of unnecessary testing. The DSM is coordinated with the T&E WIPT. A sample DSM is at table 5–2.

Table 5–2
Sample data source matrix

Issue	Criteria	MOE/MOP	IOT	FDT/E	DT	Kr test	M&S	Market survey
1. Capability of kill improved?	1–1. Pk if < 20 planes	1–1–1. Pk=#K/T# Tgts 1–1–2 (etc.) 1–1–3 (etc.)	P		P	S	S	P
2. Firing rate effect?	2–1. 1 round per launcher every 5 sec	2–2–1 R=S $_{=}$; DUREI/S #U 2–2–2 (etc.)		P	P			
3. Detect accurately in operational environment?	3–1. Detect 91% @ 2 miles	3–3–1. Pd=#D/T#Tgts 3–3–2. (etc.)	P			P		S
4. Identify targets?	4–1. Identify 98% of detects	4–4–1. Pi=#I/#D	P					
5. (etc.)	5–1. (etc.)	5–5–2. (etc.)	P	P				

Notes:
P = primary data source; S = secondary data source; Kr = Contractor.

5–20. Pattern of Analysis

The Pattern of Analysis (PA) is a major element in OT event planning. It provides the transition between the measures contained in the approved SEP to the identification of the actual data elements required to calculate a response for the measures. The PA is required for all operational test events and becomes an appendix to the EDP for the event. It is staffed, approved, and distributed as part of the overall requirements for the EDP. The PA is normally prepared in dendritic format and depicts, in hierarchical format, the relationship of COI and AI along with the associated criteria into measures and related specific test and/or evaluation questions, data requirements (additional related questions), and/or data elements. The PA can be displayed in narrative terms or graphically and is normally developed by the tester in conjunction with the system evaluator.

a. The initial portion of the PA is developed by the system evaluator as a function of the development of the detailed evaluation requirements following approval of the system evaluation strategy. Using the approved strategy and the COI and AI, the system evaluator develops the initial dendritic portion of the PA to organize requirements under the broad areas of effectiveness, suitability, and survivability. Each issue or requirement for the issues is assigned to one of the functions of effectiveness, suitability, and survivability, as appropriate. Measures are developed to address requirements to answer each issue (without concern as to the data source). This process may suggest that a draft AI could be better incorporated in another area and eliminated as a separate issue. The testers and system evaluator use these measures to support development of the required data sources and the DSM. The tester finalizes the PA and develops the individual data elements by using the measures assigned to a specific event.

b. As part of the process, the testers and system evaluator establish a priority for each measure using the priority levels 1, 2, 3, or 4. A priority assists if test resources are subsequently changed necessitating a change in the test design:

(1) *Priority 1.* Measures required for answering the COI for effectiveness, suitability, and survivability. Measures that are directed for inclusion by others who approve/disapprove test plans (for example, DUSA(OR) and DOT&E).

(2) *Priority 2.* Supportive measures that mitigate the level of risk in answering issues, check-out areas resulting from CE lessons learned, as well as critical mission essential software functions that did not work well during DT.

(3) *Priority 3.* Measures that are prudent to collect that support the issues (for example, causality or diagnostic).

(4) *Priority 4.* Measures that are recommended for inclusion by others in the T&E community (for example, AMSAA, PM, or TSM).

c. The ultimate goal of the PA is to link COI and AI with simple, measurable data elements. The key to establishing this link, within the process of subdivision, is the identification of each MOE or MOP. MOEs focus on mission accomplishment and mission utility. They serve as the higher level measures. MOPs normally can be expressed numerically in observable terms, which represent identified dependent variables by which the system performance can be characterized. Data elements are the lowest level of information collected and generally require recording of an item of information that is factual, based upon observation or instrumentation, and requires no linkage with any other data element to record. A quality PA is used by the tester to assist in the planning and development of requirements for the event scenario or other scheduling plan and the data collection and management plan. See paragraph 6–43*g* for further details on the PA.

5–21. Modeling and simulation

M&S is always considered to support the evaluation of systems as they proceed through the life cycle. Use of M&S includes, but is not limited to—

— Identification of test parameters and key measures.
— Determination of high risk areas.
— Prediction of system performance.
— Assisting in the allocation of resources.
— Stimulation or stressing of the system under test for operational realism.
— Assessment of system capabilities in situations that cannot be tested.

a. System models in evaluation. System models that are used in system evaluation should be the same as, or traceable to, the models used for concept development, AoA, system design, and production. Synthetic test environments may also be reused for training, operations planning and rehearsal, and subsequent concept developments. Participation by the system evaluator on the ICT/IPT, as part of the system collaborative environment, will allow the system evaluator to know what M&S are required, and provide input and recommendations for existing M&S already used by the testing community. Additionally, the evaluator may also see an opportunity to accredit existing M&S for system evaluation purposes.

b. Use of M&S. M&S can be used extensively to support the continuous evaluation process that includes the software development process. Testing of complex systems can be large in scope and require conditions that are difficult, if not impossible, to create short of actual combat. The practicalities of cost, time, test range space, availability of advanced threat systems/surrogates, and safety, will necessarily limit test planning and test data availability. M&S can address these limitations. System evaluation may require physics-based M&S to extend the understanding of the available test data and to extrapolate or interpolate to conditions that cannot be tested due to constraints and limitations in the test environment. While M&S does not replace testing, it is a complementary tool in the continuous evaluation process.

c. Simulation, Test, and Evaluation Process. USD (AT&L) policy requires that Simulation, Test, and Evaluation Process (STEP) be an integral part of the TEMP. The STEP Guidelines describe how T&E can be enhanced with the application of M&S tools. Testing produces M&S with increased credibility and allows for the assessment of system performance in areas and under conditions that might not be otherwise available with conventional testing methods. Simulation support planning must consider how M&S will be used in T&E and, in particular, VV&A requirements. The SSP should be crosswalked to the TEMP at each TEMP update to ensure STEP objectives can be met. The underlying approach to testing will be to model first, simulate, then test, and then iterate the test results back into the model. Figure 5–2 depicts typical uses of M&S in pre-test, test, and post-test applications, to support STEP methodology. The model-test-model process begins with the selection of the appropriate M&S tools to support the test design. Special emphasis is put on predictive analysis to ensure the development of meaningful, cost effective tests. The following paragraphs discuss the three phases of the model-test-model methodology:

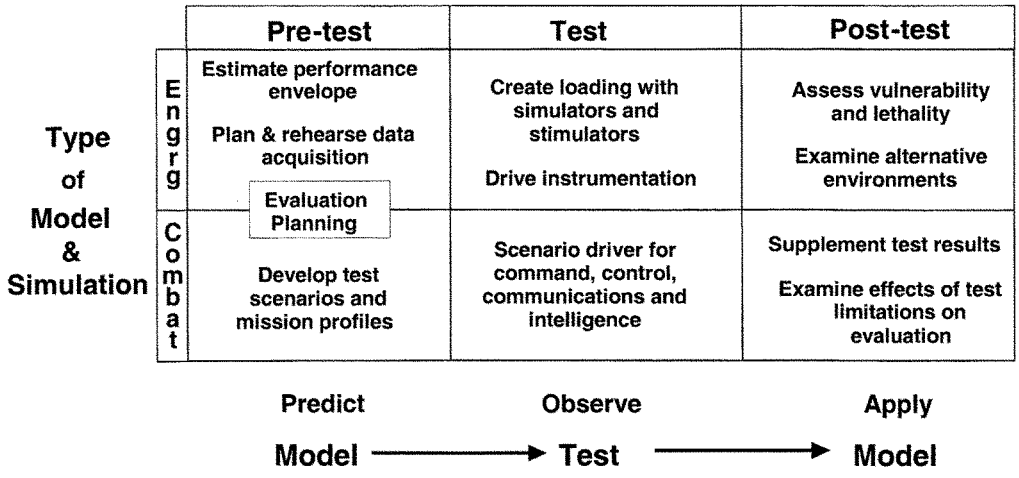


Figure 5–2. Models and simulation applications

(1) *Pretest modeling phase.* Pretest modeling estimates a range of test results prior to conduct of record trials/events. These results may aid the tester in supporting test design and test scenario development. Normally the pretest phase addresses the adequacy of test profiles/scenarios to support the test objectives. For example, does the planned test scenario provide the opportunity to collect information at the required ranges of engagement or ranges of communications for the system evaluation? Additionally, pretest M&S can be used to make more efficient use of test resources to avoid impractical use of test assets. If M&S shows that certain levels of countermeasures are expected to render the test item ineffective, sufficient testing to define the envelope of these levels must be conducted to validate the M&S predictions. M&S can be used to scale resources such as targets, warheads, or countermeasures in order to obtain equivalent MOE given constraints of resources, ranges, and test units. M&S can also be used to train test personnel, support test design (for example, number of trials, size of Blue and Red forces, check execution timing, plan location of test support equipment, validate threat surrogates/simulators), estimate key factors/conditions that most impact system performance, and develop and refine test design matrices.

(2) *Comparison of M&S with test results phase.* Comparison of M&S and test results begins with conduct of the test. Extensive work is required to develop adequate operational realizations of systems in combat models. The model results and test results must be compared to determine the significance of differences that may occur. The comparison must assess if calibration of the model is appropriate. Calibration should be conducted when it is determined that model components must be adjusted before any further application of the model will be accredited. Examples of model components critical to accreditation for T&E purposes include: weapon system algorithms, man-machine and environmental interfaces, and the model scenario representation.

(3) *Post-test modeling phase.* The final phase of the process is the use of the model to make additional estimates. These estimates may supplement test results. Issues for evaluation and the completeness of the test will determine exactly what modeling will be required. Listed below are examples of how M&S may be used to supplement and extend test results as well as explain unexpected test results:

(a) Applying MOEs/MOPs to situations other than those tested (running many iterations based on trial results, varying terrain, varying force sizes).

(b) Investigating potential benefits of product improvement or changes in doctrine or organization.

(c) Analyzing the sensitivity of the evaluation findings to known limitations in approximating realistic mission profiles, for example, types of countermeasures that could not be played.

d. Army M&S guidelines. The Army's "Guidelines: Use of Modeling and Simulation (M&S) to Support Test and Evaluation (T&E)" dated 18 April 2000 provides detailed information on the application of M&S to T&E, verification and validation of M&S, as well as planning for and sources of M&S. It also provides points of contact, examples of M&S use in weapon system development, and integrated verification, validation, and accreditation (VV&A) of M&S in the life cycle management process. It is available at the Web site for the U.S. Army Test and Evaluation Management Agency, http://www.hqda.army.mil/tema/. The use of M&S in conjunction with T&E should be documented in the system's TEMP and SSP. The SSP provides a summary of the T&E approach and appropriate test resources cross-referenced to the TEMP. The TEMP and the SSP ensure that M&S and test resources are allocated throughout all phases of the acquisition cycle.

e. M&S in system evaluation. During development of the system evaluation strategy, the system evaluator, in coordination with the testers, determines the M&S requirements during development of the initial test and evaluation strategy, including determining if appropriate M&S exists or if it must be developed. A consistent and traceable set of tools should be used throughout the T&E process to ensure consistency and validity of evaluation results. The model-test-model methodology supports pre-test analysis, test execution, and post-test analysis.

f. M&S use during pre-test. Mission-level simulation is used during pre-test analysis to design the test scenario(s), determine test conditions, and plan the sequence of trials. Timing of events can be planned, control variables examined, and test objectives evaluated in force-on-force or command and control environments. Using the system model or distributed product description, the tester and/or system evaluator can simulate the test mission to time events, examine control variables, and select the best places to place instrumentation or collect data.

g. Linkage of models. The force-on-force combat or war-gaming models that assist in the evaluation of the system's synergistic contributions to total force effectiveness may already have been used in generating the ORD or conducting the AoA. Use of the same models to design and drive operational test scenarios promotes linkage of test design to test requirements (such as, TEMP, SEP, ORD, and MOP/MOE). They are primarily applied to address force-on-force issues for battalion and larger force structures, and can provide affordable realism without very large deployments. Throughout test execution, physics-based, or empirical models of expected system performance, can be used to control the test instrumentation, and validate the data in real time, during the execution of live tests of complex systems in complex environments. The same or similar models can be used to investigate excursions of system performance under conditions that are not tested. High performance simulators and stimulators generate and render synthetic environments

and stimuli to induce, in the system under test, the same response that the actual environment or stimuli would in a battlefield situation

h. M&S use during post-test. During post-test analysis, M&S applications support system evaluations by expanding the test envelope and extrapolating system performance conditions to realistic environments or non-testable conditions. As M&S applications are validated, calibration data are fed back into the pre-test models. Thus, the simulation may be validated by the actual live test exercise results, and the test exercise may gain credibility from the comparison with the simulation.

i. M&S considerations in live test. The selection of M&S tools should be coupled with concurrent considerations for selection of live test events to ensure the approach developed to execute the evaluation strategy is the most cost-effective. Inherent in this process is the need to validate data sources. Live tests must be verified for efficient and effective design and validated to ensure that environmental conditions are appropriate and sufficient and that specific issues (information voids) are adequately addressed. M&S must be verified for logical stepwise process and use of sound software engineering techniques; validated for output, relative to input, that is comparable to real world observations; and officially accepted (accredited) as a source of credible data for a specific application.

j. Verification, validation, and accreditation (DA Pam 5–11). A basic M&S tenet is that the use of any M&S in support of, or supplementation to, T&E is that the M&S be accredited if its results are used in the system evaluation. The Army requires verification, validation, and accreditation (VV&A) of Army M&S as early as possible in the developmental process. The VV&A methodology must be tailored to the specific characteristics of the system being acquired.

(1) Verification is the process of determining if M&S accurately represents the developer's conceptual description and specifications and meets the needs stated in the requirements document. The verification process establishes if the simulation correctly performs the intended functions and the extent to which the simulation has been developed using sound systems engineering practices.

(2) Validation is the process of determining the extent to which M&S accurately represents the real world from the perspective of the intended use of the model or simulation. Validation has to do with the fidelity of M&S, which is judged by several factors, one of which is its ability to predict the known or best estimate of the behavior of the real system when subjected to the same stimuli.

(3) Accreditation is an official determination that M&S is acceptable for its intended purposes. It is based on experience and expert judgment and includes consideration of the extent to which V&V has been accomplished.

(4) Table 5–3 shows VV&A documents and responsibilities.

Table 5–3
VV&A responsibilities

W&A	M&S sponsor	M&S developer	Accreditation action officer
V&V Plan	Responsible	Assists	Use/Assist
Verification	Responsible	Performs	Aware/Assist
Validation	Responsible	Assists	Aware/Assist
V&V Documentation	Responsible	Assists	Awareness
Accreditation Plan[1]	Assists	Assists	Responsible
Accreditation Request[1]	Assists	Assists	Responsible
Accreditation Report	Assists	Assists	Responsible

Notes:
[1] The signature authority for Accreditation Plans and Accreditation Requests is the approver of the document in which M&S is used.

5–22. Development of MOEs, MOPs, and data requirements

a. Definition for MOE, MOP, and data requirements.

(1) MOEs are quantifiable elements of operational effectiveness used in comparing systems or concepts or estimating the contribution of a system or concept to the effectiveness of a military force. They express the extent to which a system accomplishes or supports a military mission.

(2) MOPs are quantifiable units of measure (such as, miles per hour) that describe the manner in which a given function or task should be accomplished.

(3) A data requirement is a quantitative or qualitative piece of information that is relevant to the determination or categorization of one or more MOP. Data requirements can consist of measures (such as, velocity, range, elapsed time,

calculated distance between two points, or number of rounds fired) that are determined from data elements. Data elements are the lowest level of information collected and only require direct observation, timing, or recording by one person (or piece of instrumentation) at a single location at a single time. Example of data elements are start and stop times, position location, round fired, type target, light level, and mission-oriented protection posture (MOPP) level. A data requirement does not generally involve summary statistics (such as, mean, median, or percent). Associated data requirements and resultant test factors and conditions are specified in the SEP, as appropriate. The system evaluator identifies data needed to support the planned evaluation and indicates those that are required from testing. The test designer includes these data requirements and derives additional data requirements needed for test control, diagnosis of problems, interpretation of the data, and quality assurance (such as, the tester typically adds the data requirements necessary to track system utilization in accordance with the OMS/MP).

(4) A COIC criterion consists of a measure (that is, either a MOE or MOP) with a quantitative threshold value. A criterion may vary in complexity depending upon the system.

b. Evaluation planning objectives. Each planning method leads to more substantive information that aids in understanding the system response. The system evaluator plans for not only the estimation of system capability but for an understanding of why the capability is as it is and for estimating how that capability might be expected to change as the system matures. These methods also help in the early identification of required instrumentation and data organization.

c. Decomposition of issues and criteria. The system evaluator uses a dendritic process for developing logic trees and work breakdown structures for breaking down issues and criteria into MOEs/MOPs. Factors and conditions are integrated and necessary event dendritics are developed to define the data requirements. A MOE quantifies the extent to which a system attains the criterion. The MOE (that is, a higher level measure that is mission-oriented) generally encompasses one or more MOPs. For example, in a communications network, a MOE would be the degree to which the system supports division command and control. The MOP might be completion rate or availability of RF links. In an example of an air defense system, the MOE may be the degree to which the system protects against hostile air attack. The MOP might be the ability to detect or engage.

(1) The issues define the relevant questions that must be answered in the system evaluation. COIC criterion statements typically identify the primary MOE. The system evaluator expands and clarifies the primary MOE into a functional dendritic that covers supporting MOPs and data requirements and data elements appropriate to the analysis of the issue. As a vehicle for discussing the development of MOPs and data requirements, an example issue, associated scope and criterion is presented in figure 5–3. The example presents a typical issue and criterion and is used to illustrate the process used to develop appropriate MOPs and data requirements. The criterion presents two obvious MOPs, and the scope presents considerations relevant to factors and conditions that need to be addressed when answering the issue.

Issue. Is the *** system effective at determining prioritized target information to support *** in the close support role?

Scope. This issue addresses the speed and accuracy with which the *** system can search, detect, and locate heat emitting targets in the European Theater. The probability of detecting a target will be examined based upon the type of target, its IR cross-section, *** system speed, search pattern, and target density.

Criterion. The *** system must have a 90% chance of detecting threat vehicular targets within two minutes and locating them within a 25 meter CEP accuracy.

Rationale. State reasons why the above are required for the evaluation.

*** represents the name of the system

Figure 5–3. Sample issue and criteria set

(2) Close examination of the issue in figure 5–3 shows many questions not explicitly stated that need to be answered to understand the ability of the system to locate targets:

— What constitutes a target?
— How will false targets be handled?
— What constitutes a target presentation?
— What constitutes a correct detection?

d. Evaluation planning questions. After answering these questions and defining the terms, additional questions become relevant. Accordingly, the planning methods help identify types of questions that lead to a more thorough and well structured database in support of the system evaluation:

— Are any of the functions accomplished by the system causing deficiencies in the time or accuracy of location?
— Are there factors or conditions that lead to deficiencies in time or accuracy of location?
— Are there areas in which training or man-machine interface could be modified to improve target location?
— Are there learning or other trends associated with target location measures?

e. Developing the data requirements. After the system evaluator identifies the primary functions of the system and these functions are broken out into secondary (and sometimes tertiary) functions and into MOPs, the MOPs are divided into the set of data requirements. For the example shown in figure 5–3, the primary mission of providing prioritized target information is quantified in the criterion statement. The functions that support successful execution of the primary mission include searching the target area, detecting targets in the area searched, identifying and classifying as red or blue the targets detected, prioritizing the identified targets, locating the prioritized targets, and tracking the moving targets which have been located.

(1) To search a target area effectively, the system needs to cover the search area and do it efficiently. Dendritic development encourages the following type of questions, the answers to which strengthen the evaluation planning:

— How does one measure coverage and efficiency?
— How do inadequacies in searching the target area affect the MOPs?
— What is special about the system that is relevant to searching and that can be quantified?
— What makes a good detection?
— What are the capabilities of the system that impact or aid detection?
— How does discrimination between true and false targets impact detecting true targets?
— How does the success of the search function impact the detection success?
— How is classification success determined and how is it impacted by validity of the target?
— Is efficiency a consideration?
— What is correct prioritization? How is it measured?
— How do undetected targets affect prioritization success?

(2) The dendritic breaks the primary mission (for example, providing prioritized target information) into lower level functions supporting MOPs and then into data requirements. Each end point consists of measurable data that are traceable to the issue through the dendritic. This approach gives a reviewer an organized way of seeing how the data requirements were derived, and promotes understanding of the relationships between measures and data requirements.

(3) MOPs may be impacted by test variables, scenarios, and conditions. These factors represent independent variables used to characterize test events and are used to categorize, analyze, and evaluate outcomes of test events.

(4) Based, in part, on the analysis concept, the system evaluator determines the appropriate factors and conditions, together with the associated degree of control, and presents them in the form of a tabular list. The tabular list typically requires footnotes with accompanying discussions to clarify how the proposed types of control measures will ensure that appropriate numbers of valid events occur under various combinations of test conditions. Table 5–4 provides a typical listing of factors, types of control, and conditions for a typical scenario.

(5) The process continues with the development of the event dendritics. Like the functional dendritic, the event dendritic consists of a hierarchical decomposition of system functions into data required for analysis and evaluation. However, instead of dividing these functions by MOP relevant to specific issues and criteria, an event dendritic decomposes these functions by the sequence of events performed. (See chap 6.)

f. Data requirements planning. The end product of the functional dendritic, the factors and conditions chart, and the event dendritic, is the set of data needed for a comprehensive system evaluation. Each of the three approaches may need expansion based on the results of the other two. Their completion is an iterative process, and the products produced form the foundation for the system evaluation. The perspectives of each approach differ and determine a complementary, albeit different, set of data requirements. Without question, these examples can be expanded to include

data requirements, MOPs, and factors not shown. The examples show the thought process and the products that lead to a comprehensive set of data requirements and an associated database that supports a comprehensive system evaluation. The functional dendritic and the factors and conditions contribute to the analysis planning. The factors and conditions chart forms the foundation for experimental design development, and the event dendritic forms a natural organization for the data.

Table 5–4
List of typical factors and conditions

Factors	Control	Conditions
Range of engagement	Systematically varied	100–500, 501–900, 901–1, 300 meters
Light conditions	Systematically varied	Day, night
Target movement	Systematically varied	Moving, stationary
Threat arrays	Systematically varied	IAW threat support package
NBC	Systematically varied	No MOPP, MOPP II, MOPP IV
Terrain (Phase I)	Systematically varied	Flat, rolling
Terrain (Phase II)	Tactically varied	Rugged, swamp
Enemy action	Systematically varied	Attack, defend
Battlefield obscuration	Systematically varied	No smoke, smoke
EW environment	Systematically varied	IAW threat support package
Personnel	Held constant	5^{th}-95^{th} percentile
Organization	Held constant	Battery level
Doctrine/tactics	Held constant	IAW D&O support package or IAW TRADOC support package
Logistics support	Held constant	ORG, DS
Communications status	Tactically varied	Radio-voice, radio-digital
Enemy target	Tactically varied	Troops, vehicle, bunker
Weather	Uncontrolled	Rain, dry, snow
System operating status	Uncontrolled	Fully operational, degraded mobility, degraded firepower, non-operational

g. SEP coordination. The system evaluator will coordinate the SEP with the CBTDEV/FP and PM/MATDEV on a regular basis during development so as to seek confirmation of understanding of the system (materiel and operational), its employment and sustainment, and evaluation measures and support for the planned system evaluation. Such coordination should be a continuation of the ICT effort that began with development of the ORD and COIC. As TEMP preparation gets underway with the T&E WIPT, the system evaluator coordinates the SEP with the full T&E WIPT.

Section IV
System Evaluation Conduct

5–23. Development of the Event Design Plan

Based upon the DSM in the approved SEP, the event design requirements for each data source are developed. Event design requirements ensure that the essential data requirements needed for the system evaluation are obtained. An EDP is prepared for each OT and, when required, for DT. The EDP contains details on the overall test design, methodology, data management, and other requirements for the test or event and ensures that the essential data requirements needed to support the system evaluation are obtained.

5–24. Analysis and evaluation of MOE and MOP

a. Issue resolution. The system evaluator develops the logical process that is intended for use in resolving the issue. This includes deciding how the data from the identified sources will be integrated and how anticipated constraints on the realism or the completeness of the data will be treated. The system evaluator develops the steps used to interpret analyses; how and where modeling, simulation, or military judgment will be used; and when appropriate, how conclusions on individual criterion will be integrated to resolve the issue. The system evaluator determines the

comparisons that are anticipated and the estimates that will be made and ascertains their utility to the system evaluation.

b. System evaluation strategies. More than one strategy can be used to address different aspects of an issue, and occasionally, it may be appropriate to use more than one strategy to address the same aspect. Discussion of each aspect of an issue is to include factors, conditions, and operational scenarios appropriate to the system evaluator's plan to investigate discrimination between the systems, organizations, methods of operation, or procedures. Three basic comparative evaluation strategies are typically used:

(1) Comparison of new or competing system capability to the corresponding capability in the system being replaced (for example, baseline).

(2) Comparison of new or competing system to a predetermined standard.

(3) Comparison of an organization's capability with and without the new system.

c. Analysis approach and concept.

(1) An analysis approach is the framework within which data for all MOPs will be analyzed. The system evaluator identifies analytical steps planned to explore and understand the data, integrates data from appropriate sources, summarizes or re-express the data, estimates parameters, and determines trends or otherwise explores the data in a manner relevant to the evaluation of the data set.

(2) The analysis concept is the anticipated framework within which data for the issue will be analyzed. The system evaluator identifies how judgmental criteria and weights will be applied and identifies anticipated graphical or arithmetical techniques and the degree to which the analysis will be exploratory (that is, finding out what the data are trying to say) or confirming (that is, using formal statistical inference to answer predetermined questions).

(a) A good analysis concept serves as a road map for the analyses that are intended to identify or support evaluative conclusions. It is not meant to be rigidly followed if the actual data or other circumstances lead to a more appropriate procedure. The use of decision support system tools is an aid in developing the analysis concept.

(b) The system evaluator identifies the specific techniques appropriate for making the comparisons or estimates called for in the analysis concept. For each comparison or estimate, the chosen technique must be planned in sufficient detail to establish a sound analytic treatment for the operational question being asked. Alternative techniques are sometimes appropriate, but no attempt should be made to perform each and every alternative form of analysis.

d. Data assumptions. After the test, actual data often render even the best-planned techniques irrelevant or inappropriate. The system evaluator should identify the assumptions associated with the data, the distributions, and the use of proposed analysis techniques. The extent to which the results from the assumptions are likely to be sensitive to deviations, especially as they impact calculations of planned confidence intervals and significance statements, should be addressed in planning.

e. Data independence. The independence of data points must be preserved. The many factors that typically influence the utility or character of a data set must be controlled. The system evaluator should identify known constraints on the use of data in support of the system evaluation and plan to handle the constraints as required. Examples of constraints are: data from a model that do not play realistic hostile or friendly air defense, data obtained from a single environment, data from immature software, logistics data limited to realistic maintenance below direct support, and data from crews that have not been cross-trained. The system evaluator includes a discussion of whether the constraints will be handled judgmentally or with formal analysis (specify technique), and clarifies the extent to which the impact of constraints is likely to be remedied.

Section V
System Evaluation Reporting

5–25. System evaluation requirements

The objective of CE is to provide periodic reports throughout a system's acquisition life cycle. The system evaluator provides periodic assessments of the system's developmental growth and progress to decision-makers, MATDEVs, logisticians, trainers, CBTDEVs, and other acquisition team members. At MS decision reviews, the system evaluator provides an independent system evaluation of the system's operational effectiveness, suitability, and survivability.

5–26. System-level reports

The SER (or SA) documents findings and recommendations throughout the life cycle of a system. The SER and SA are system-level reports that integrate the information from various event-level reports into an overall assessment of the system. These reports are provided to the MDA for all programs and to OSD for T&E oversight programs. Figure 5–4 depicts an example of the system-level reporting process.

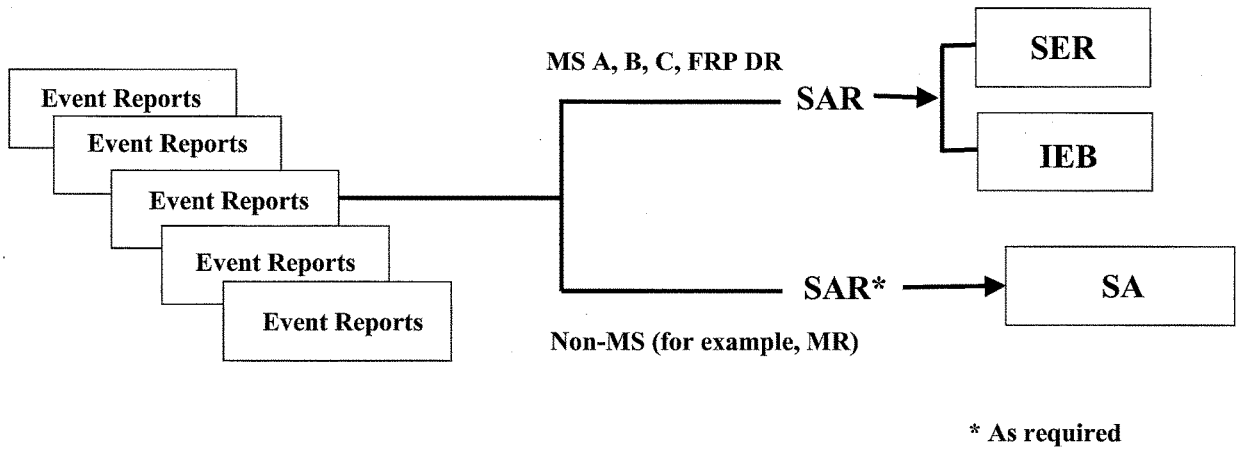


Figure 5–4. System-level reporting process decision

a. System Evaluation Report. The System Evaluation Report (SER) documents the independent system evaluation findings and recommendations regarding a system's operational effectiveness, suitability, and survivability. It is provided at each milestone supported by a SAR that provides the detailed analyses to support the evaluation.

(1) Provides the decision authority with an independent evaluation of the system's performance and operational effectiveness, suitability, and survivability at each MS. When writing the SER, keep in mind the milestone that the evaluation is supporting. A system that has good potential for meeting requirements may be acceptable at MS C but may, or may not, be acceptable at FRP DR when demonstrated results, not potential, are important.

(2) The SER is a stand-alone document and uses all credible data sources.

(3) The Safety Confirmation is always appended to the SER.

(4) The SER follows the content requirements of the SEP and includes introduction, which includes test limitations and impacts, findings and analysis, and recommendations. Detailed formats may be obtained from ATEC HQ.

(5) The SER is principally written by the system evaluator.

b. System Assessment. The System Assessment (SA) provides an assessment to date for non-MS decisions (for example, materiel release) and at any point when requested by the MATDEV or the decision-maker. It provides an assessment of the progress toward achieving system requirements and may address a subset of the overall evaluation issues. The SA may be based on a single event or a series of events, and the scope of the issues to be addressed is flexible because it may or may not cover all aspects of effectiveness, suitability, and survivability. The SA may identify needed modifications and provide information on tactics, techniques, doctrine, organizations, and personnel requirements. The SA is principally written by the system evaluator and always includes a Safety Confirmation as an appendix.

c. System Analysis Report. A System Analysis Report (SAR) may be prepared in support of the SER or SA if more detail is required. The SAR provides the analysis supporting the system evaluation in enough detail to allow anyone to reconstruct the data and perform additional analyses. It includes in-depth analyses, causality investigations, and diagnostic excursions. The SAR—

(1) Is principally written by the system evaluator.

(2) Accounts for all issues and measures contained in the SEP when the SAR supports a SER.

(3) Provides the analysis supporting a SA only when the analysis is too detailed for inclusion in the SA.

(4) Accounts for only those issues and measures contained in the SA when the SAR supports a SA.

d. Independent Evaluation Brief. The system evaluator prepares an independent evaluation brief (IEB) based on the SER and/or SA. The system evaluator presents the IEB to the PM/MATDEV, CBTDEV/FP, and decision review body (Defense Acquisition Board, ITAB, Army Systems Acquisition Review Council, or IPR panel). The briefing summarizes the SER submitted to the milestone decision and contributes to recommendations by the MDR body to the decision-maker, as well as to management decisions by the MDR body. The IEB—

(1) Follows the same outline as the SER.

(2) Summarizes the information contained in the SER in a briefing format.

e. Emerging Results Brief. The decision to release emerging evaluation results is made by the T&E activity commander on a case-by-case basis. The system evaluator may be required to provide emerging results immediately

after a key event (for example, in order to provide information to various DR organizations when there is not sufficient time to wait for the final SER or SA). The system evaluator develops the emerging results brief (ERB).

f. Safety Confirmation. Prior to a milestone decision or a materiel release decision, a Safety Confirmation is provided to the decision-makers as part of the SER and/or SA. The Safety Confirmation provides the safety findings, states whether the specified safety requirements are met, and addresses the risk of proceeding to the next phase of the acquisition cycle. The Safety Confirmation is provided by DTC. (See app N.)

5–27. Event-level reports

For each test event that supports the system evaluation, a test report is completed. The report may be called by different names depending on the type of event. Test report formats may be modified to accommodate any peculiar circumstances associated with the event. The test report should fully document the activities and results of the test. The test activity that conducts the test event will prepare, approve, and publish the test report in coordination with the T&E WIPT. (See chap 6.)

a. Test Incident Report. Test Incident Report (TIR) data are prepared by the test organization (Government or contractor) to provide the results of any incident occurring during testing, to report the results of subtests, and to serve as interim reports. TIRs are reported by both DTC, OTC, and other T&E activity through the Army Test Incident Reporting System (ATIRS) database and include corrective action data, if required. ATIRS is administered by the Aberdeen Test Center located at Aberdeen Proving Ground, Maryland. (See app V.)

b. Developmental, operational, and live fire test reports. Developmental, operational, and live fire test reports are addressed in chapter 6.

5–28. Source Selection Evaluation Board

The Government developmental tester and system evaluator will be involved in the Acquisition Requirements Package (ARP) preparation process and can be an advisor to and may, if appropriate, participate as a member in the Technical Evaluation/Source Selection Evaluation Board. The early involvement of testers and the system evaluator in the ARP process and Source Selection Evaluation Board is necessary and is consistent with the Army's CE concept.

Chapter 6
Testing

Section I
Introduction

6–1. Overview of testing

This chapter provides procedural guidance for developing strategies for the testing of all acquisition programs. The primary objective of testing in support of the acquisition process is to provide data to identify and resolve technical, safety, and logistical issues and to verify the attainment of operational goals and objectives. The structuring and execution of an effective testing program is absolutely essential to the acquisition and fielding of Army systems that meet the user's requirements.

6–2. Philosophy of testing

a. Extent. The need for testing is based on the question: "What don't we know that we need to know that can only be obtained from testing?" Testing is conducted only to the extent necessary to provide the answer. Although the time and resources expended on testing are only a small portion of the complete acquisition life-cycle costs, the influence of testing is significant. Experience has demonstrated that where tests have been eliminated or reduced, deficiencies in the system have been overlooked, only to surface after deployment, resulting in expensive and time consuming modifications. Where testing has been adequate and complete, systems have gone to production and deployment sooner than anticipated, thus saving time and money, and with favorable results reflected in the field. All T&E WIPT members must work to avoid unnecessary duplication of testing efforts.

b. Principles. Testing is conducted by applying objective principles to provide data in support of an impartial system evaluation/assessment. Adherence to these principles is necessary to ensure valid estimates of a system's expected operational effectiveness (including survivability and vulnerability) and operational suitability (compatibility, interoperability, RAM, logistic supportability, safety, health, human factors, and trainability). While it is difficult to state established principles simply, they may be summarized in three terms: adequacy, quality, and credibility.

(1) *Adequacy.* The amount of data and realism of test conditions must be sufficient to support the resolution of the COIC and AI.

(2) *Quality.* The test planning, control of test events, and treatment of data must make the information clear and accurate.

(3) *Credibility.* Test conduct must be objective. OT data handling must be separated from external influence and personal/organizational self-interest.

6–3. Waivers of approved testing

DT and OT that are specified in the approved TEMP must be conducted unless a waiver has been obtained from the TEMP approval authority. Policy for waiver requests can be found in AR 73–1, paragraph 7–1.

6–4. Testing of commercial items and non-developmental items

DT and OT requirements should be tailored to each specific system. DT and OT should be conducted at a minimum to verify integration and interoperability with other system elements. Additional T&E, as appropriate, should be conducted to evaluate and control risk. For more information, see paragraph 5–5*b* of this pamphlet. The following provides general guidance, not rigid requirements, of the testing activities appropriate for commercial items, to include commercial-off-the-shelf (COTS), and non-developmental items (NDIs) options:

a. Commercial items or NDI to be used in the same environment for which they were designed (that is, no development or modification of hardware or software is required) will normally not require DT before the MS B decision; however, available data should be sufficient to assess safety, RAM, performance, producibility, supportability, and transportability. The technical feasibility test (TFT) may be conducted to support the MS decision. When the production contract is awarded to a contractor who has not previously produced an acceptable finished product and the item is assessed as high risk, a production verification test is required and a limited user test (LUT) may be required before materiel release.

b. Commercial and NDI items that require some modification of hardware or software (for example, militarization or ruggedization) may require a TFT unless the decision authority documents that further testing is not required. A production qualification test (PQT) is required if feasibility testing results in the necessity for fixes to the item. To support materiel release, a PVT is required, and a LUT may be required.

c. A research and development effort is required for integration of commercial items and NDI subsystems, modules, or components that contribute to a materiel solution. Systems engineering, software modification, and testing are required to ensure the total system meets user requirements and is producible as a system. A TFT may be required in a military environment. A system-level PQT is required, while hardware and computer software integration tests and/or a LUT may be required. If the PQT or LUT identifies required fixes, a PVT is conducted to address only those

parameters that are still in question. If the PQT and/or LUT are completely successful, the PVT may take the form of a first article test. The PQT and PVT should be similarly designed.

d. Emphasis should be given to logistics support when acquiring commercial items and NDIs. Maximum use will be made of existing commercial support, and existing data should be used whenever possible. A logistics demonstration (LD) or supportability test should be considered when the envisioned military support concept differs from the existing commercial support concept and when no data exist to confirm adequacy of the proposed concept.

e. Some follow-on testing of the commercial item or NDI may be required to verify the adequacy of corrective actions indicated by the PVT.

f. Serious consideration should be given to electromagnetic environmental effects (E3) and radio frequency spectrum supportability when acquiring a commercial item or NDI for worldwide deployment and fielding. Commercially available spectrum dependent equipment may not be frequency supportable in certain international regions and every sovereign nation. Host nation spectrum management approval is required prior to fielding and operations.

g. The OT can provide data not obtainable through other sources (for example, M&S and DT) or may be used to validate previous analytical efforts. It is applicable for all development systems, including commercial or NDI and system changes, unless waived (see AR 73–1) or not required by the TEMP or the system's approved AS.

6–5. Testing of clothing and individual equipment

Clothing and individual equipment (CIE) is a collective term that includes personal, optional, and organizational clothing, and individual equipment (usually listed in CTA 50–900 or CTA 50–970) that is not an integral part of the design and operation of an equipment item. AR 70–1 and DA Pam 70–3 govern CIE acquisition. The overall philosophy and process are described in AR 70–1, except that the Army Clothing and Equipment Board (ACEB) and the Clothing Advisory Group (CAG) recommend items for approval by the VCSA.

a. Upon procurement of a CIE item, Government initial production testing should be conducted to certify the specifications so that future procurements and the Defense Logistics Agency's quality control are effective. T&E management documents for the acquisition of CIE are the same as those required for materiel and C4I/IT systems acquisition acquired under the auspices of AR 70–1 (that is, TEMP, SEP, EDP, detailed test plan (DTP), test report, and SER).

b. Requirements for OT of CIE are based on the COIC associated with the program.

6–6. Joint T&E

The OSD directed JT&E Program brings two or more Services together to evaluate technical or operational concepts, interoperability, testing methodologies, and joint military mission capabilities; improve M&S; and provide feedback to the acquisition community, as directed in a formal charter from the Director, Strategic and Tactical Systems, Under Secretary of Defense (Acquisition, Technology, and Logistics), (USD (AT&L)). An annual OSD nomination process, a feasibility study process of 8–10 months, and a testing process of 3 or more years support the JT&E Program.

a. Army nominations are solicited annually, in the March-April timeframe, for consideration by an Army Nomination Board that convenes in January of the following year. The Army's participation in the JT&E Program is managed by HQDA (DCS, G–8–FD). The selection of suitable nominations to become feasibility studies and the selection of completed feasibility studies to become chartered OSD-directed JT&E is determined primarily by the recommendations of the Senior Advisory Council (SAC), co-chaired by the Director, Strategic and Tactical Systems of USD (AT&L) and DOT&E. The Army's SAC representative is from HQDA (DCS, G–8–FD), reviews the Army Nomination Board's prioritized recommendations, and approves the Army nomination(s) submitted to OSD to compete for entry into the feasibility study phase.

b. After being directed by OSD, the lead Service will conduct a joint feasibility study over the next 8–10 months to assess the need and feasibility for executing the JT&E, expand and refine the nomination test concept, prepare a feasibility study report that specifies resource requirements for OSD and the Services. During this phase each feasibility study will be reviewed by an OSD Technical Advisory Board (TAB) three times. The TAB provides technical guidance and makes feasibility recommendations to the SAC. Upon completion of the feasibility study and favorable review by the SAC, the JT&E candidate may be recommended for charter as a JT&E.

c. JT&E charters designate a "lead Service" and one or more "supporting Services." OSD is the primary source of funding for a chartered JT&E. The Services provide office facilities, personnel to staff the Joint test force, test support, and other personnel and equipment to participate in test events, consistent with their involvement as defined in the approved feasibility study.

d. HQDA (DCS, G–8–FDR) manages Army participation in the JT&E Program and provides a member to the JT&E Planning Committee (PC). The JT&E PC is a working-level body that meets to review nominations, exchange information on Service positions and prepare nominations for presentation to the SAC. HQDA (DCS, G–8–FD) also provides the Army's voting member on the SAC. For chartered JT&E, ATEC maintains manpower authorizations on the U.S. Army Element Joint Test Activities TDA, requisitions personnel to staff the full-time test directorate positions, budgets for the Army's participation and lead Service costs, and coordinates Army-wide JT&E support requirements through the TSARC process. All personnel and resource actions regarding the JT&E Program are reviewed and

approved by HQDA (DCS, G–8–FD). ATEC provides technical T&E advice through test document reviews, technical advisory groups (TAGs), general officer steering committees (GOSCs), and membership on the OSD JT&E Technical Advisory Board (TAB).

e. For more information on JT&E see http://www.jte.osd.mil/, DODD 5010.41 (JT&E Program), DOD 5000.3–M–4 (JT&E Procedures Manual), http://www.deskbook.osd.mil, and AR 73–1.

f. The MOA among the four OTA commanders dealing with Joint T&E can be found by accessing http://www.hqda.army.mil/tema.

6–7. Multi-Service operational test and evaluation

a. A Joint Requirements Oversight Council (JROC) approval of a requirement that impacts more than one DOD component normally initiates an acquisition and, thus, multi-Service tests. Tests are conducted for systems being acquired by more than one DOD component or for systems that interface with equipment of another Service. OSD designates a lead Service to prepare the T&E plan and final report on the system. However, resource planning and support are the same as for any other Army OT. Requirements are documented, coordinated, and prioritized in the TSARC and FYTP processes. ATEC is the focal point for coordination of Army resources to support multi-Service test and evaluation. This includes budgeting for the testing necessary to accomplish assigned test objectives and for participation of Army personnel and equipment in the entire test program.

b. DT for acquisition programs being developed and tested jointly follows the testing procedures of the designated lead Service. All program documents, including the TEMP, as well as other T&E plans and reports, are developed by the lead Service. (See AR 73–1.)

c. The MOA among the four OTA commanders dealing with multi-Service operational test and evaluation (MOT&E) can be found by accessing http://www.hqda.army.mil/tema.

6–8. Testing in support of system changes

T&E of system changes (that is, modifications, upgrades, and horizontal technology integration) will be conducted to verify the extent of the change and its operational impact on mission accomplishment.

a. The MATDEV, in coordination with the T&E WIPT, determines the DT requirements. (See para 5–5 and fig 5–1.)

b. Requirement for OT is based on the COIC and further outlined in the TEMP and SEP.

6–9. Testing in support of reprocurements

Reprocurements of materiel and C4I/IT systems may require DT and OT, depending on the level and type of configuration changes (see AR 73–1). Testing requirements to support reprocurements of non-tactical C4/IT systems generally follow those options outlined for information system changes. Changes that apply to all types of systems and may require DT and/or OT to be conducted as follows:

a. The system being procured is a different make and model from the original system or is being produced by a different manufacturer.

b. The system has had a break in production of more than 2 years.

c. The system's operational capability envelope has changed.

d. Testing types for reprocurements are—

(1) Pre-FRP DR tests include PQT, PVT, LUT, and IOT.

(2) Post-FRP DR FOT is conducted rarely and only as needed for reprocurements.

(3) TRADOC may use a CEP test to redefine requirements for reprocurements to include testing in support of NDI market investigations.

(4) TRADOC may use FDT/E as required for system reprocurements.

6–10. Foreign comparative testing

The foreign comparative (FCT) testing program recognizes the value of NDI items of allied and friendly nations to satisfy DOD Component requirements or correct mission area shortcomings. The program is dependent on user interest and a valid operational requirement for a developed foreign item with good procurement potential. FCT can eliminate unnecessary testing. A favorable evaluation, usually based on DT data, of the foreign item is also required.

6–11. Testing in support of limited procurement

OT is conducted and can be expedited to support limited procurement (LP) prior to materiel release to the first unit equipped (FUE) if the urgent requirement permits. The ATEC's OTC participation in LP procurement can cover a spectrum of involvement, for both war and non-wartime urgent procurement. OTC participation in LP procurement can provide a test report based on results of a quick reaction LUT. ATEC's DTC Safety Confirmation will be provided to support LPs.

6–12. Testing in support of the combat and training development process

Force development tests or force development experiments are conducted with troops under field conditions. A FDT/E supports force development and materiel development processes by examining the effectiveness of existing or proposed concepts of doctrine, training, logistics, and materiel. A FDT/E may be conducted during any phase of the materiel acquisition process. It may be related to, combined with, or used to supplement OT. During the requirements formulation effort, FDT/E may be used to determine essential and desirable capabilities or characteristics of proposed systems. Prior to MS B, a FDT/E can be used to assist in refining concepts of employment and DOTMLPF listed in CJCSI 3010.02A (Joint Vision Implementation Master Plan), or in lieu of OT when operational issues are adequately addressed. FDT/E also includes field experiments designed to gather data through instrumentation to address a training development problem or to support simulations, models, wargames, and other analytical studies. Requirements for FDT/E may also be generated by the results of combat developments, training developments, or training effectiveness analysis, testing, and studies.

a. FDT/E used to support the acquisition process should be included in the TEMP.

b. The organization for which the FDT/E is being performed provides the general requirements that establish the FDT/E objectives. These are normally stated in terms of operational issues and criteria, test or experiment objectives, or data requirements for subsequent analysis. Regardless of the form, these requirements are used as the basis for the design of the FDT/E.

c. Design of the FDT/E is documented in a SEP and/or an EDP.

d. FDT/E may be structured to provide necessary information to support development of JMEMs. Such needed information may be in the form of weapons characteristics data (for example, blast and fragmentation), weapons employment/engagement scenarios/conditions, and in the form of operational suitability.

6–13. Acquisition Requirements Package and Source Selection Evaluation Board

The Government developmental tester, operational tester, and system evaluator may be involved in providing technical information or advice to the Acquisition Requirements Package (ARP) and Source Selection Evaluation Board (SSEB). Testers and evaluators are usually not SSEB members, and thus they do not make selection recommendations or decisions.

6–14. Combined and/or integrated testing

The increased emphasis to streamline the acquisition process requires the T&E community to always consider combining or integrating testing. A combined developmental test and operational test (DT/OT) is a single event that produces data to answer developmental and operational system issues. A combined DT/OT is usually conducted as a series of distinct DT and OT phases at a single location using the same test items. For the case where a single phase can be used to simultaneously meet developmental and operational issues, this testing will be referred to as an integrated DT/OT. Combined DT/OT and integrated DT/OT are encouraged to achieve time, cost, and resource savings. However, they should not compromise DT and OT objectives. The execution strategy for an integrated DT/OT event is based on the requirements of the program. The testers and system evaluator, in coordination with the T&E WIPT, must look objectively at the expected outputs to determine the worth of the event to the overall information and data needs for evaluation of the system.

a. Each test event (whether separate, combined, or integrated; a model; a simulation; or a model or simulation used in conjunction with live testing) has an appropriate role to play in providing data/results for evaluation of a system's performance, safety, and operational effectiveness, suitability, and survivability. The requirements of the developmental or operational environment coupled with statutory and regulatory requirements will usually require some degree of separate DT early in the program and separate OT late in the program. However, an integrated test/simulation execution strategy will be developed when it is judged to be the most effective and efficient event to support the evaluation requirements. The MATDEV, along with the T&E WIPT, must assess the technical risks associated with choosing this approach.

b. Specific types of DT and OT are defined in AR 73–1. How tests might be combined or integrated to provide all the necessary data for the system evaluation is always tailored to the specific program while recognizing that there are many possibilities within these guidelines.

(1) In the early phase of a program, tests will be primarily focused on technical and performance evaluation to establish technical validity, resolve design problems, and support development of a mature production representative design. At this stage, much of the test activity may not directly address operational issues. The goal of test integration at this stage is to assure that operational issues are considered in the resolution of technical problems and corresponding design changes. At the other end of the spectrum, IOT should be conducted with a mature production representative system with all technical hardware and software problems resolved. Between these two extremes is the greatest opportunity to achieve economy and efficiency through effective test integration that will address as many developmental and operational issues as possible with a single, comprehensive, and integrated test effort.

(2) A combined DT/OT is conducted as a continuum, with distinct entrance and exit criteria. A combined DT/OT need not be a simultaneous event. A combined DT/OT event is typically a series of distinct DT and OT phases. The DT phase focuses on generation of technical test data under control of the developmental tester and may permit

MATDEV and system contractor involvement. The OT phase focuses on generation of operational test data under the control of the operational tester with typical user personnel in an appropriate operational environment using production representative systems. MATDEV involvement is limited and system contractor involvement is normally prohibited during this phase unless contractor logistical support (CLS) is part of the Army's fielding plan.

(3) Integrating DT/OT into a single phase requires that normal DT and OT requirements will not be compromised and that any statutory or regulatory requirements for MATDEV and system contractor involvement are maintained.

c. There are many issues that must be considered when combining or integrating tests, such as—

(1) An event taking place pre-MS C may combine or integrate a technical feasibility test (TFT), an engineering development test (EDT), or a software development test (SDT) with an early user test (EUT). A post-MS C event might be a production qualification test (PQT) combined or integrated with a limited user test (LUT). An integrated test will not normally include an IOT for a major defense acquisition program. A post-FRP event may be a production verification test combined with a follow-on operational test (FOT).

(2) Integrating the TFT/EUT is most appropriate for events conducted before MS B when the operational requirements are not generally subject to restrictions required for tests in support of the production decision. An additional benefit is that increased system contractor involvement can be included to assist both the DT and OT elements in the test to better understand, maintain, and explain performance of the system. Limitations for this type of event would increase if the TFT/EUT was used for a selection among candidates for further development or if the system complexity or risk required extensive safety requirements for user personnel.

(3) Integrated testing following MS C must be considered carefully. Considerable resources are normally required to bring all the elements necessary for a LUT into position at an appropriate location. Any significant risk that the system may not be ready for OT requirements (such as, potential user safety risk, inability to properly train user personnel, or other possible shortfalls in meeting the OT requirements for the event) should be carefully considered. OT is normally conducted at the home station of the designated user unit. Consideration of whether the DT objectives can be achieved in the typical operational environment must be considered. After the FRP decision, integrated testing can be performed, but the same issues must be considered. A PVT/FOT event is possible after a careful review of the requirements.

(4) Combined DT/OT can generally be conducted within all phases of the acquisition program cycle. The key limitation is generally the required location for the combined test. As stated, most OTs are performed in the typical operational environment and would require DT elements to test at that site. Additional requirements are the availability of an appropriate Safety Release for the personnel operating the system in the OT phase, and adequate confidence that the system would be ready to continue into the OT phase following the DT. DT typically leverages matrix resources and specialized, fixed facilities optimized to reduce time and cost while ensuring data accuracy. Any situation that would prohibit continuance of the OT phase would result in loss of the resources assembled for the phase. Subsequent reschedule of the testing would require additional resources and add to the overall cost and timelines for the program.

(5) Additional considerations when developing an integrated test strategy include—

(a) Various degrees of integration can be achieved by using M&S in conjunction with live testing. (See para 5–21.)

(b) Using the same data collectors for both DT and OT. This ensures the data disseminated in the TIRs are consistent, making it easier for the evaluator to understand and use the data.

(c) Using the same military test participants. This will provide OT soldiers more experience on the test systems, ensuring that the test players are more representative of those who would use the mature, fielded system. It will also provide early user influence in the design allowing the hardware to mature sooner. Even so, the system evaluator must be aware of the specific level of training so as not to create an unwanted "Golden Crew" situation.

(d) Using the same instrumentation. This will eliminate redundant development and ensure that the instrumentation developed will meet all requirements.

(e) Using common questionnaires and data forms to facilitate data handling and summarization by the evaluators.

(f) Considering the possibility of collecting OT data during DT.

(6) Section 2399 of Title 10 of the USC, the Defense Acquisition Guidebook, and AR 73–1 all set limitations on system contractor involvement in OT events. Statutory and DOD requirements exist for those systems designated as MDAPs, that is ACAT I and II. Army policy applies the same restrictions to all Army acquisition programs.

(a) Army policy requires that system contractor personnel will not—

— Participate in operational events except to the extent that they are involved in the operation, maintenance, and other support of the system when it is deployed.
— Participate in collecting, reducing, processing, authenticating, scoring, analyzing, or evaluating operational test data.
— Attend or be directly involved as members or observers in DAG (see para 6–52), RAM Working Group of the T&E WIPT, and RAM Scoring and Assessment Conferences that address data supporting the system evaluation of their systems. Serving as technical subject matter experts (SMEs) outside of these forums is allowed.

(b) Application of the system contractor involvement limitations can usually be made without undue difficulty in the separate phases of any combined DT/OT. Clear understanding of actions considered permissible during both phases is

needed prior to test execution. This will ensure that all concerned understand the constraints and the point at which DT ends and OT begins.

(c) If an integrated test is conducted prior to the LRIP decision, more involvement of the system contractor is permissible because such data are generally not used to support the FRP decision. However, if the data will be used to support the FRP decision, the full restrictions must be considered.

(7) The end result of the combined or integrated DT/OT is information provided to support the system evaluation. A properly structured SEP will normally provide the required data for the evaluation at the various program decision points. The T&E WIPT must consider the most effective and efficient use of testing, including M&S, as an overall component of the strategy. Combined or integrated testing should be considered as one tool to be used but not as the only tool in the toolbox. Separate DT and OT will, in some programs, still provide useful information and data not obtainable in combined or integrated testing. Risks must be carefully considered to ensure that combined and/or integrated testing is not performed under conditions that do not provide usable information.

Section II
Developmental Testing (DT)

6–15. Overview of development testing

a. DT is a generic term encompassing engineering-type testing, generally requiring instrumentation and measurements, which is accomplished by engineers, technicians, and soldiers, as necessary, using instrumented open air ranges, hardware in the loop simulators, installed system test facilities, models, or simulations. It includes technical feasibility testing, engineering development testing (such as, capacity, stress, and performance testing; security certification testing, tactical communications, and interoperability testing), software development testing, production qualification testing, production verification testing, and testing in support of post-deployment hardware and software evolution, as well as support to identify and resolve problems revealed during sustainment.

b. DT identifies the technological capabilities and limitations of the alternative concepts and design options under consideration. DT also identifies and describes design technical risks. DT can assist in the design of a system at the component, subsystem, and system level by reducing technical risk prior to transitioning to the next level;

c. DT stresses the system under test at least to the limits of the Operational Mode Summary/Mission Profile by "pushing the envelope" to ensure expected operational performance environments can be satisfied. For some systems it may be appropriate to push beyond the normal operating limits to ensure the robustness of the design.

d. DT can address the potential of satisfying OT&E requirements to the best extent possible by testing in operationally relevant environments (simulated or actual), without jeopardizing DT objectives, to reduce overall T&E redundancy and costs.

e. DT can analyze the capabilities and limitations of alternatives to support cost-performance trade-offs.

f. DT can assess progress toward meeting KPPs and other ORD requirements, COIC, mitigating acquisition technical risk, and achieving manufacturing process requirements and system maturity.

g. DT assesses technical progress and maturity against critical technical parameters, to include interoperability, documented in the TEMP.

h. DT provides data and analytic support to the decision process to certify the system ready for OT.

i. DT, in the case of IT systems, supports the IT systems security certification process.

j. Prior to full-rate production, DT demonstrates the maturity of the production process through Production Qualification Testing of LRIP assets.

k. DT is conducted throughout the acquisition process to assist in the systems engineering design and development of a system, provide safety verification, and to verify that performance specifications have been met. Plans for DT should be coordinated with a Simulation Support Plan (SSP). The goals being increased effectiveness of the systems engineering process as well as implementation of a sound Simulation, Test and Evaluation Process (STEP). (See AR 73–1, para 3–1.)

l. DT provides data with which to assess validity of assumptions incorporated in M&S; performance levels of new technologies inserted into prototype hardware; achievement of systems engineering design goals; compliance with CTP; and to identify technological and design risks and determine readiness to proceed to IOT. DT is conducted throughout production to accommodate product acceptance testing necessary because of manufacturing changes allowed by performance based acquisition strategies. If a program experiences technical or operational problems, DT provides a valuable service by helping to identify problems and verify fixes before they seriously affect program cost and schedule. A concerted effort is required by the testers, system evaluator, and the system developer to mature the equipment technically and properly test it before transitioning to OT or the production processes. DT substantiates the achievement of contractor technical specifications.

m. DTs are designed to subject the system or its components, both hardware and software, to stress levels commensurate with those to which the mature system will be subjected in all operating environments. To the degree feasible, tests should be conducted in accordance with the OMS/MP. If required, DT may subject the system to stress levels that will estimate the outer limits of the operational envelope. DT determines the system safety, technical

performance, MANPRINT, human factors performance, reliability, survivability, ILS, interoperability with associated equipment, and the integrity of the equipment. A Safety Release (based on the results of DT) is required before involving soldiers in any test. (See paras 6–64 and 6–65.)

6–16. Developmental test planning

a. As chair of the T&E WIPT, the PM/MATDEV works with its members to structure a T&E program concurrently with the acquisition strategy. (See chap 2.) Consideration must be given to DT over the system's entire life cycle. Program planning documents are a source of information to assist the T&E WIPT and the developmental tester in identifying future resource requirements (for example, personnel, funds, facilities, and instrumentation).

b. Before each acquisition decision milestone, sufficient DT and system evaluation must be done to demonstrate reduced acquisition risks and to estimate the capability of the system to meet the CTP. DT programs are structured to provide sufficient data to allow evaluation of issues regarding, but not limited to, safety; performance; RAM; and MANPRINT considerations. The system evaluator provides the MDA with information that addresses the CTP, specifying which parameters have been designated as exit criteria by the MDA. Exit criteria are the specific minimum requirements that must be satisfactorily demonstrated before the program's next acquisition decision milestone can be scheduled.

c. DT is planned and conducted to take full advantage of the existing investment in DOD ranges and other test facilities, whenever practical. Agencies with requirements for developmental, production, or post-production testing of military materiel must use DOD MRTFB activities and other DA test facilities instead of establishing in-house capabilities or contracting for testing services. Exceptions will be justified in the TEMP (see AR 73–1 and the Defense Acquisition Guidebook). DT is coordinated with ATEC's Developmental Test Command (DTC) or the Space and Missile Defense Command (SMDC) to maximize the Army's capital investment in its MRTFB facilities. This coordination takes place before program initiation and facilitates the generation of DT requirements as well as determining the extent and nature of contractor services, if required.

(1) The DOD MRTFB is an aggregation of test activities, facilities, ranges, and equipment designed to provide DOD with the best overall military T&E capability. See DOD Directive 3200.11 for a summary of capabilities of all DOD MRTFBs. The MRTFB is operated and managed under uniform reimbursement policy. DOD test customers utilizing the MRTFB are required to pay only those costs that are directly identified to the test. The indirect or overhead costs are funded by the MRTFB activity's parent command (see AR 73–1, para 7–3).

(2) The MRTFB and other test and R&D facilities are capital investments designed to provide comprehensive testing capabilities that support all materiel acquisition programs. These facilities have unique capabilities and expertise and offer significant cost benefits to customers.

(3) DA MRTFB activities are: Yuma Proving Ground (YPG), AZ; Dugway Proving Ground (DPG), UT; U.S. Army Aberdeen Test Center (located at Aberdeen Proving Ground, MD); White Sands Missile Range (WSMR), NM, including U.S. Army Electronic Proving Ground (EPG) (located at Fort Huachuca, AZ); U.S. Army Ronald Reagan Ballistic Missile Defense Test Site (RTS), Kwajalein Atoll, Wake Island; and High Energy Laser Systems Test Facility (HELSTF), WSMR, NM. Appendix R of this pamphlet contains a brief description of the DA test capabilities, including the DA MRTFB activities.

6–17. Developmental testing of non-tactical C4/IT systems

DT of non-tactical C4/IT systems in support of system evaluation includes software development tests, software production qualification tests (PQTs), and tests in support of either post-production software support (PPSS) or post-deployment software support (PDSS).

a. Software development tests are an inherent part of development and are conducted by the developer of the system's program at the unit, module, and integration level.

b. PQTs are conducted at the system-level on target hardware by a Government developmental tester prior to the FRP DR. A PQT is conducted after the system security certification settings and mechanisms have been implemented and frozen so as to not invalidate the qualified baseline. Tests during PDSS consist primarily of modifications and maintenance of software. (See para 5–15*e*(10) and app Q.)

c. System-level DT is conducted at stress levels representative of data volumes expected to be encountered under the most extreme circumstances (for example, deployment surge, wartime operation with full force structure participation, and year-end closeout processing). DT will be structured to estimate the outer limit of the system's operational envelope.

6–18. Mission of the developmental tester

a. The developmental tester plans, conducts, and reports the results of DT. As a T&E WIPT member, the developmental tester assists in designing an effective DT program. DT reports are provided, as appropriate, to the MATDEV, the system evaluator, other members of the T&E WIPT as authorized by the MATDEV, the milestone decision review body, and, for ACAT I and other OSD T&E oversight programs, to OSD through the DUSA(OR).

b. DT and associated production testing on Army materiel systems are normally executed by U.S. Army DTC unless otherwise designated in the TEMP. Exceptions for DT may be non-tactical C4/IT systems assigned to the U.S. Army

Communications-Electronics Command (USACECOM) (by the HQDA (CIO/G–6)), USAMEDCOM, USAINSCOM, USASMDC, and USACE.

6–19. Testing for commercial entities

The Army is authorized to provide testing services to commercial concerns (AR 73–1, para 7–4). Policy dictates the rates charged as follows:

a. When a contract between a private industry and a DOD agency already exists and includes language authorizing test support/services from Army test facilities, Army test agencies are authorized to charge DOD rates. RDT&E contracts should include the following specific language: *The contractor is authorized to obtain test support/services at DOD rates from Army test ranges as Government-furnished services.* Under these circumstances, DOD rates be charged to the Defense contractor provided the Army test agency receives a copy of the contract containing the required language. The request for test and cost estimate as well as payment of test funds may come from private industry. If the funds are received at the test agency directly from private industry, a contract must be signed by both parties and in place prior to testing. A prospective contractor who is preparing to bid on a Government contract that includes a requirement for testing may request and receive a cost estimate for the test from the Army test agency.

b. Test services may be provided by Army facilities for private industry when no related acquisition contract exists. The FY94 Defense Authorization Act amended Title 10 of the U.S. Code to provide increased access to DOD T&E facilities by commercial users. DOD guidance requires MRTFB facilities to charge commercial customers all direct costs associated with the test but permits the MRTFB commanders to determine the indirect costs to be charged as deemed appropriate.

6–20. System contractor participation in developmental testing

DT objectives include verifying system maturity, logistic supportability, human factors, security features, and system safety. Therefore, testing is designed to find, analyze, and fix problems and verify the solutions. Meeting these objectives requires engineering level involvement of and discussions with system contractor personnel.

a. The degree and nature of system contractor involvement in DT that is not inherent to development is agreed upon by the MATDEV, the system evaluator (when the DT supports the system evaluation), the Army test agency, and other agencies or organizations, as applicable. These agreements are reached through the T&E WIPT process and are then communicated through the contractual requirements. Developing these agreements early will help to ensure that test data will be usable for the system evaluation.

b. System contractor involvement may range from total control during testing that is inherent to development (that is, unit, module, and integration) to no direct involvement, to providing spare parts and technical advice during the conduct of a DT, to performing the entire spectrum of DT. When the system contractor is directly involved in the conduct of DT at an Army test facility, special consideration may be required to address security, personnel safety, and the protection of competition sensitive test data. Special consideration should be given to control of Web based developmental software that is under test, where the application server is under control of external elements such AKO portals, and developers only have write capability access to the application. Consideration should be given to the use of a combined Government/contractor DT team, especially when the system contractor will perform the testing. Use of the DT team provides for Government participation in the development of the system contractor test plans. The test results are reported by the system contractor and verified by the Army test personnel, thus avoiding duplication of testing.

c. The degree of system contractor involvement in the RAM scoring and assessment conferences (see app K) dealing exclusively with DT and system evaluation will, likewise, be determined by the MATDEV and system evaluator in coordination with the T&E WIPT. System contractor personnel, in general, should not be physically present during the formal voting/scoring and assessment period. However, the presence of system contractor personnel may be allowed during formal scoring at developmental scoring conferences if it is considered necessary for proper information flow. At anytime in this process, a system contractor may be asked to appear to answer questions but should leave after the questions have been answered. Exceptions to this guidance are discussed in the following paragraph.

d. In those cases where DT and OT are planned and described in the TEMP to be combined or integrated under similar conditions (for example, OMS/MP, stresses, environmental conditions, test support, and fixed or same configuration), DT results will be combined with OT results in support of the system evaluation. The parameters for system contractor involvement must be carefully coordinated initially at the T&E WIPT and throughout the T&E process to ensure the MATDEV's contractual obligations and the system evaluator's statutory restrictions are met. (See AR 73–1.)

6–21. Developmental test data confirmation

The purpose of test data confirmation is to ensure the widest possible use of data. The T&E WIPT first determines whether or not a need exists to confirm certain test data. A review of each test is performed and the criticality of the use of the data is assessed. This determines which tests require confirmation so the data generated can be used for system evaluation purposes. Test data confirmation is determined by the T&E WIPT.

a. Acceptability of data. In those instances when a particular facility's ability to provide acceptable data is in doubt, the Government developmental tester, the MATDEV, and the independent system evaluator, if appropriate, inspect the

facility to verify acceptability of data. For this reason, it is essential that the T&E WIPT review and coordinate on the T&E portion of the RFP prior to its issuance. The following factors should be considered in determining the acceptability of the test data that will be generated:

(1) Ranges, courses, test apparatus, and support equipment available to tester.

(2) Laboratory facilities, instrumentation, and calibration available to tester.

(3) Test personnel experience and expertise, test procedures, and data collection and reporting procedures used by tester.

b. Government monitoring. In those instances when the test data from a particular source or procedure would not otherwise be acceptable, the independent system evaluator may require the test to be conducted by Government test personnel or that the data be validated through monitoring by Government test personnel.

c. Confirmation process. Once the confirmation process has been established, the MATDEV relies upon the Government developmental tester to provide assistance in contractual proceedings. Prior to bid solicitation, the MATDEV—

(1) Provides the T&E portion of the RFP to T&E WIPT members for coordination and to confirm test data acceptability.

(2) Provides to prospective contractors in the RFP, the option of using Government test services, funded directly by the materiel developer. This provides flexibility to the contractors and gives the T&E WIPT a known source of acceptable data, should other sources prove unacceptable. (See AR 73–1, para 7–4.)

d. Contract requirements. To help ensure acceptability of test data, contracts specify that the contractor—

(1) Provide a test plan to the materiel developer for T&E WIPT coordination prior to testing.

(2) Report test incidents to the MATDEV and system evaluator.

(3) Report the corrective actions taken in response to test incidents to the MATDEV and system evaluator.

(4) Provide a test report to the MATDEV and system evaluator. If contractor test data will be used to satisfy certain technical requirements, a copy of the contractor test report should be provided to the Government developmental tester by the MATDEV.

6–22. Developmental testing and the Army Logistician

The logistician works closely with the acquisition community through cross-functional IPTs, Integrated Logistics Support Management Team (ILSMT), T&E WIPT, and other program reviews to ensure DT provides data for a continuous assessment of logistics support program management and execution. The Army logistician contributes to the identification and resolution of logistics issues while reviewing and assisting with the development of program management documentation and preparation of DT event design requirements. The Army logistician assists the acquisition community with selected analyses using approved models to support repair or discard decisions, level of repair decisions, selection of secondary items to be stocked, and other cost benefit analyses. For class VIII medical materiel, the Army logistician is the USAMEDCOM.

6–23. Developmental test types

DTs are categorized as reflected in AR 73–1, chapter 4. A definition and brief description of the types of DT that can be performed throughout the system's acquisition life-cycle is described below. The test types are separated into the pre-Full Rate Production, Production, and Post-Production phases. The software tests defined here are SDT, SQT, and PDSS.

a. Pre-FRP developmental testing. DT can be conducted during the period before program initiation and prior to the full-rate production decision using funding categories 6.1 through 6.4. (See DOD Financial Management Regulation, Volume 2B, Chapter 5 for information on funding categories.) Pre-FRP DT test types are as follows:

(1) Research efforts conducted during the pre-systems acquisition phase to determine early technical parameters, to support the research of these items, and to provide fundamental knowledge for solutions of identified problems.

(2) A technical feasibility test (TFT) is typically conducted during the concept and technology development phase to assist in determining safety, establishing system performance specifications, and determining feasibility of alternative concepts. Testing identifies and reduces risks in subsequent acquisition phases. This test provides data for the independent system evaluation that supports the SER required for MS B decision.

(3) An engineering development test (EDT) is conducted during system development and demonstration to provide data on system limitations and performance, safety, security, NBC survivability, the achievability of a system's CTP, refinement and ruggedization of hardware configurations, and determination of technical risks. The EDT includes the testing of compatibility and interoperability with existing or planned equipment and systems and the system effects caused by natural and induced environmental conditions. An EDT may be conducted at the component/subsystem or system levels.

(4) A production prove-out test (PPT) is conducted during systems acquisition (that is, post-MS B and before production with prototype hardware) for the selected design alternative. The PPT is usually performed at the subsystem level and provides data on safety, NBC survivability, the achievability of CTP, refinement and ruggedization of hardware and software configurations, and determination of technical risks.

(5) A production qualification test (PQT) is a system-level DT conducted post-MS C that ensures design integrity over the specified operational and environmental range. PQT must be completed using LRIP assets, when available. PQT normally uses prototype or pre-production hardware and software fabricated to the proposed production design specifications and drawings. Such tests include contractual RAM demonstration tests required prior to production release. This test provides data for the system evaluation that supports the FRP DR. The objectives of the PQT are to obtain Army confirmation that the design is stable, logistically supportable, capable of being produced efficiently, and will meet the performance/user requirements; assess the inherent performance envelope; meet security requirements, and determine the adequacy of any corrective action indicated by previous tests. PQT may also include tests that are not included in the data package or contract (for example, environmental extremes and test-to-failure) when such tests are necessary to obtain engineering data to verify corrective action or other purposes. PQT may be accomplished in phases (for example, preliminary engineering and specific problem correction). When conducted by the contractor, the PQT is designated PQT–C.

(6) A live fire test is conducted for those weapons systems required by 10 USC 2366 to undergo LFT&E (see chap 5 and app J). The LFT may be conducted as part of or in conjunction with the PQT. The LFT demonstrates battle-resilient survivability or munition lethality. It will provide insights into the principal damage mechanisms and failure modes occurring as a result of the munition/target interaction and into techniques for reducing personnel casualties or enhancing system survivability and lethality. The scope of LFT&E generally will include the building-block approach, progressing from early component-level testing, to sub-system/system level testing, culminating in a series of full-up, system level (FUSL) live fire tests. (See app S.)

(7) A logistic demonstration (LD) examines the achievement of maintainability goals; the adequacy and sustainability of tools, test equipment, built-in-test equipment, selected test program sets, technical publications, maintenance instructions, trouble-shooting procedures, and personnel skill requirements; the selection and allocation of spares and repair parts, tools, test equipment, and tasks to appropriate maintenance levels; and the adequacy of maintenance time standards. The LD is ideally conducted at least 6 months prior to the IOT to allow time to make corrections, if required. It is often convenient to conduct an LD in conjunction with the PQT. The LD may use selected analysis, evaluations, demonstrations, and testing tailored to each acquisition program to demonstrate adequacy of the proposed support concept and programmed support resources.

(8) A software development test (SDT) covers the full spectrum of tests that are inherent to software development (that is, M&S, unit, module, integration, security, stress, conversion, software certification, and full-up system testing prior to Government testing).

(9) A software qualification test (SQT) is a system-level test conducted by the Army developmental tester using live data files supplemented with user prepared data and executed on target hardware. Conversion procedures and special training requirements are introduced as additional elements for verification and validation. SQT objectives are to have the Government confirm that the design will meet the performance/user requirements and to determine the adequacy and timeliness of any corrective actions indicated by previous testing. System users participate in the technical and functional aspects of the SDT. (See app T.)

(10) Joint interoperability certification testing applies to all Army C4I systems having interfaces or interoperability requirements with other Service systems. This test may consist of simple demonstrations using message analysis or parsing software with limited interface connectivity, or extend to full-scale scenario-driven exercises with all interfaces connected. The U.S. Army CECOM SEC serves as the Army Participating Test Unit Coordinator (APTUC), and in that capacity, supports interoperability testing of C4I systems conducted by the DISA, JITC for system certification and re-certification. The CECOM SEC APTUC arranges, coordinates, and participates at all Joint interoperability testing with the DISA and coordinates the participation of all Army elements and systems. See JITC Plan 3006, Joint Interoperability Test Plan (JITP), for testing Tactical Data Link (TDL) and U.S. Message Text Format (USMTF) systems located at http://www.disa.mil/main/jitc.html. The U.S. Army AMCOM Software Engineering Directorate (SED) serves as the aviation, air, and missile defense representative to the APTU, provides tactical hardware and systems along with associated sensor simulations in support of interoperability testing, coordinates with PEOs/PMs to schedule interoperability test assets, and prepares the Army aviation, air, and missile defense systems for connectivity into the JITC testing environment.

b. DT production testing. Production testing is required to verify that the requirements specified in the ORD and production contracts for hardware and software are met. It also provides test data for the system assessment required for materiel release decision, ensures the product continues to meet the prescribed requirements, and provides a baseline for post-production testing.

(1) The production verification test is a system-level test conducted post-FRP to verify that the production item still meets CTP and contract specifications, to determine the adequacy and timeliness of any corrective action indicated by previous tests, and to validate the manufacturer's facilities, procedures, and processes. A PVT will also provide a baseline for the test requirements in the technical data package for post-production testing. The PVT is accomplished during the first limited production or full-scale production contract. This test provides data for the materiel release (MR) decision, allowing the system evaluator to address the adequacy of the system with respect to the stated requirements. Materiel release is accomplished during the first post FRP DR production contract and is repeated if the

process or design is significantly changed, if a second source for the system or major components therein is brought on line, or if a significant break in production occurs. (See AR 700–142.)

(a) The PVT may take the form of a first-article test (FAT) if such testing is required in the technical data package for quality-assurance purposes. This may be required to qualify a new manufacturer or procurements from a previous source out of production for an extended period of time, and to produce assemblies, components, or repair parts that conform to the requirements of the technical data package. Requirements for FATs may be invoked in production contracts by citation of the applicable Federal Acquisition Regulation First Article Inspection and Approval clause. When a FAT is specified in a contract, it may not be waived or changed without prior approval of the head of the contracting activity. A FAT may be conducted at Government facilities or at contractor facilities when observed by the Government. Requirements for the FAT should be consistent with those of the PVT.

(b) The PVT may also include tests that are not included in the data package or contract (for example, environmental extremes and test-to-failure) when necessary to obtain engineering data for corrective action verification, to support a materiel release decision, or to meet another purpose.

(c) Follow-on PVT. A follow-on PVT may be conducted on full production models if the production process or design is significantly changed, or to verify the adequacy of corrective actions indicated by the PVT or to determine production acceptability. A follow-on PVT is structured similarly to PVTs.

(2) A comparison production test (CPT) is a test of randomly chosen samples from production and is conducted as a quality assurance measure to detect any manufacturing or quality deficiencies that may have developed during volume production that could reduce effective operation of the item or result in item degradation. The CPT is conducted or supervised by an agent independent of the producer or by Government on-site quality assurance personnel, and may be conducted at procuring agency facilities, Government testing installations, or contractor facilities.

(3) Quality conformance (acceptance) inspections are examinations and verification tests normally prescribed in the Technical Data Package (TDP) for performance by the contractor and are subject to performance or witnessing by the on-site quality assurance representative on the items, lots of items, or services to be offered for acceptance under the contract or purchase order. These examinations and tests include, as necessary, in-process and final measurements or comparisons with technical quality characteristics required to verify that materiel meets all the terms of the contract and should be accepted by the Government.

(4) Tests in support of PDSS are DTs that are conducted during PDSS for software intensive materiel systems. They parallel those described for pre-FRP DR, but are usually abbreviated based on the number, magnitude, and complexity of the modifications or maintenance. Tests in support of PDSS are conducted to assure that software modifications meet requirements, do not impair existing functions or performance, can be employed by users, and are effective and suitable.

(5) A Service level test (SLT) is the final preparation test prior to participating as a system under test in the joint interoperability test (see fig 6–1). The U.S. Army AMCOM SED serves as the Service level test agent for Army aviation, air, and missile defense systems. A Joint C4I interoperability certification test is conducted if major hardware and software modifications to the C4I system have been made that impact on previously established joint interface requirements. Re-certification test schemes must be developed and must be commensurate with the level of changes involved in both the C4I system and the systems with which it must interoperate. The CECOM SEC APTUC arranges, coordinates, and participates at all Joint interoperability testing with DISA, JITC, and coordinates the participation of all Army elements and systems. See JITC Plan 3006 JITP for testing Tactical Data Link and USMTF systems can be found at http://jitc.fhu.disa.mil. The U.S. Army AMCOM SED interfaces with the CECOM SEC to plan and schedule the Army aviation, air, and missile defense system participation in Joint C4I interoperability certification testing.

c. Post-production DT. Post-production DT is conducted to measure the ability of materiel in the field, in storage, and following maintenance actions (reworked, repaired, renovated, rebuilt, or overhauled) to meet user's requirements (for example, conform to specified quality, reliability, safety, and operational performance standards).

(1) Surveillance/stockpile reliability tests include destructive or nondestructive tests of materiel in the field or in storage at field, depot, or extreme environmental sites. They are conducted to determine suitability of fielded or stored materiel for use, evaluate the effects of environments, measure deterioration, identify failure modes, and establish/predict service and storage life. For example, the PATRIOT program's Stockpile-to-Target Test Program. Surveillance test programs may be performed at the component-through-system level. System-level programs may include dedicated hardware allocated for this purpose, fielded materiel, or supplies in storage. "Libraries" of component parts to provide a baseline for subsequent surveillance test data comparisons may be established at contractor or Government facilities. Criteria for surveillance testing will be prescribed in the appropriate technical bulletins, technical manuals, storage serviceability standards, and surveillance test plans.

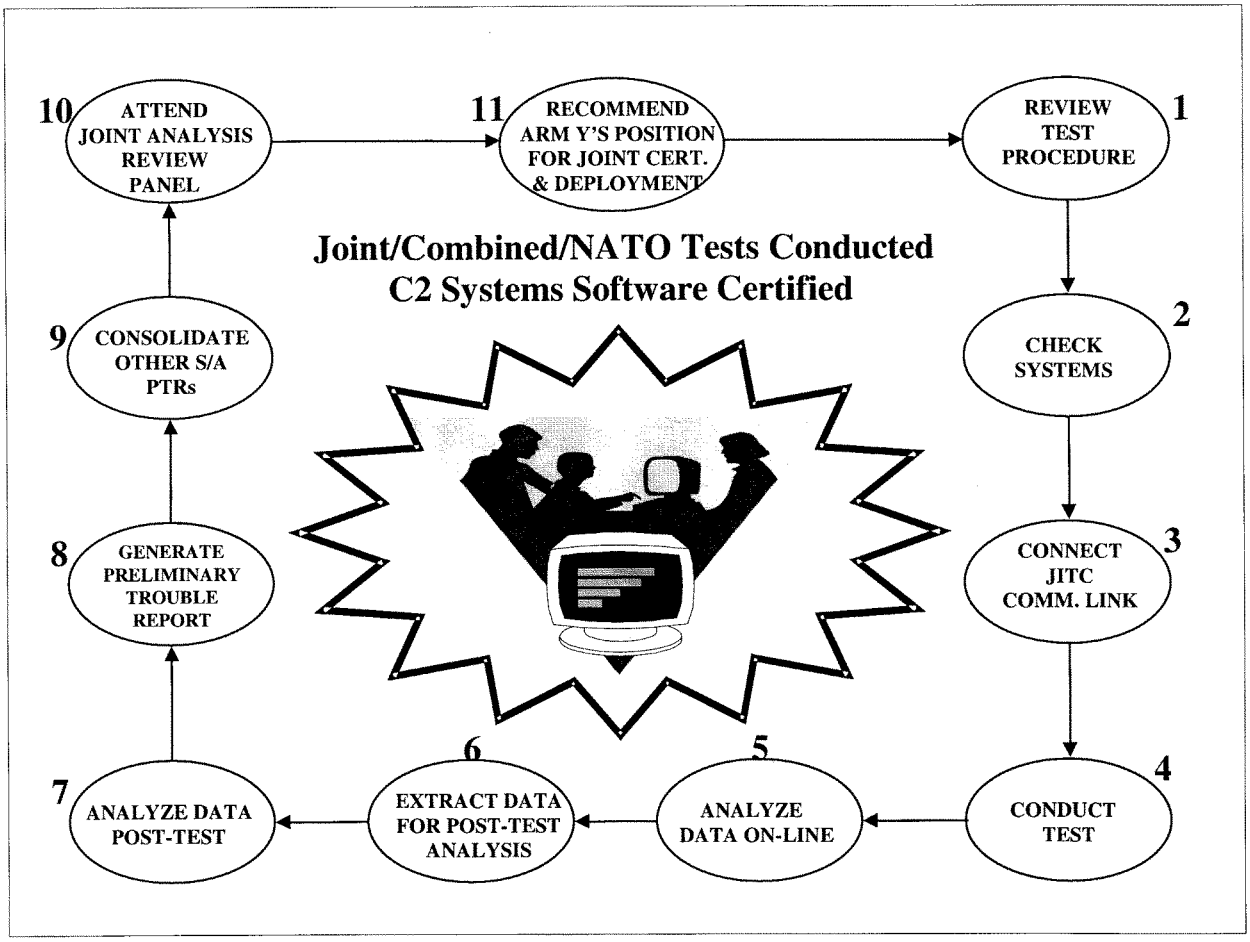


Figure 6–1. Joint/Combined/NATO interoperability testing cycle

(2) Reconditioning tests. Criteria for reconditioning tests will be incorporated in depot maintenance work requirements (DMWR), modification work orders (MWO), technical manuals (TM), technical bulletins (TB), and contracts. Reconditioning tests include the following categories:

(a) Pilot reconditioning tests are conducted to demonstrate the adequacy of the documented technical requirements, processes, facilities, equipment, and materials that will be used during volume reconditioning activities. The pilot model will be reconditioned in strict accordance with DMWRs, MWOs, TMs, TBs, and contracts. Pilot reconditioning testing relates to PVTs during production. Pilot reconditioning tests will be applied when DMWR, MDO, TM, or TBs are used the first time or when major changes are made.

(b) Initial reconditioning tests are conducted to demonstrate the quality of the materiel when reconditioned under volume (rate) procedures and practices. These tests relate to FATs during production. Initial reconditioning tests will be conducted when an item is reconditioned for the first time by a Government or contractor facility, when changes in processes or facilities occur, or when there has been a significant break in reconditioning operations.

(c) Control tests are conducted on randomly selected items from volume reconditioning operations to verify that the process is still producing satisfactory materiel. Criteria should be the same as for initial reconditioning tests. These tests relate to CPTs during production.

(d) Acceptance tests are conducted on in-process materiel and when reconditioning activities are completed. An accept/reject decision by the procuring organization is based on acceptance testing.

(e) Baseline evaluation tests (BETs) are conducted simultaneously on reconditioned and new production materiel of the same configuration to provide a comparison of performance and to determine the degree of reconditioning required. BET will be considered when the item is being reconditioned for the first time, when significant modifications

affecting performance are incorporated, or to provide data on which to base a decision regarding upgrading versus new procurement.

(3) Test criteria for post-production developmental testing will be based on performance demonstrated during development and production. The number of items to be tested and the duration of tests will be based on sound engineering practices that consider schedules, costs, item complexity, known problem areas, statistical confidence, and other factors (for example, T&E WIPT proposed criteria and recommendations). Prior test data and analytically derived design data will be used when the test and sampling plan is developed. Existing test facilities will be used rather than building new Government or contractor facilities.

6–24. Requesting developmental test services

This paragraph provides procedures for requesting developmental test services from ATEC's DTC and SMDC's USAKA/RTS and HELSTF.

a. Program planning forecast. It is helpful to both the PMs/MATDEVs and the testing organizations to have early identification of future testing requirements. This permits the test agency to identify future requirements for test resources and provides a quantitative basis for test priorities and allocation of resources. It also supports requirements for facility development or upgrade, instrumentation development and acquisition, and test methodology studies, as well as justification for military construction plans to ensure scheduled tests can proceed without delay. When these future test requirements are identified, the MATDEV will be provided with a preliminary budget estimate and test schedule; however, this does not constitute a firm commitment by either party.

(1) Future testing requirements are generally those scheduled to occur beyond the next 180 days and cover the current fiscal year, the budget fiscal year, and the POM years. When providing such forecasted test requirements, the MATDEV should provide as much of the information reflected in paragraph 6–33 as is available.

(2) Provision of future test requirements can be accomplished efficiently by an exchange of information through the T&E planning process. For example—

(a) As early in the acquisition cycle as possible, as T&E requirements are being considered during concept exploration and definition.

(b) During the preparation/review of the TEMP.

(c) As a result of negotiations at T&E WIPT meetings.

(d) During program reviews, test coordination meetings, and so forth.

b. Firm testing requirements.

(1) Firm test requests should be submitted as early as possible to allow the test agency to plan, coordinate, and schedule resources and ensure that required safety, security, and environmental concerns have been properly addressed prior to the test.

(2) The firm test request should include the information reflected at figure 6–2. Documentation required includes a Safety Assessment Report, Health Hazard Assessment Report (HHAR), Security Classification Guide, environmental documentation (for example, Record of Environmental Consideration, Environmental Impact Statement, and Environmental Assessment) and SMMP (if required). If these documents are not available at the time the test request is submitted, the request should reflect a date as to when the documentation will be provided.

(3) Any other documentation or information that would enhance DTC's or SMDC's understanding of the test effort should be included.

c. Test requests. Test requests directed to the DTC may be submitted as follows:

(1) The most efficient way to request unclassified test services from DTC is through the Internet. Internet test requests are available anytime either through Army Knowledge Online or at URL http://www.dtc.army.mil. Upon submission of each request, the customer will receive a tracking identification number verifying receipt of the request and to be used for future reference.

(2) In writing to the Commander, DTC, ATTN: CSTE–DTC–TT–B, 314 Longs Corner Road, Aberdeen Proving Ground, MD 21005–5055. Requests may also be provided via e-mail (ttb@dtc.army.mil), facsimile (DSN 298–9170), commercial ((410) 278–9170).

d. To request testing or additional information regarding SMDC's High Energy Laser Systems Test Facility. Contact the Director or Deputy Director at HELSTF Directorate, SMDC–TE–H, White Sands Missile Range, NM 88002–5148. The voice telephone number is DSN 349–5045/5074, commercial (505) 679–5045/5074.

e. To request testing or additional information regarding the SMDC facilities at U.S. Army Ronald Reagan Ballistic Missile Defense Test Site. Contact the Kwajalein Support Directorate, P.O. Box 1500, Huntsville, AL 35807–3801. The voice telephone number is DSN 645–3952, commercial (256) 955–3952; facsimile number is DSN 645–1880.

6–25. Developmental Test Readiness Review

The Developmental Test Readiness Review (DTRR) is chaired by either the MATDEV or developmental tester and is conducted to determine if the developmental item is ready for developmental testing. As a minimum, the DTRR is conducted prior to PQT for materiel systems or SQT for non-tactical C4/IT systems. While not as rigid, the DTRR schedule could parallel that recommended for OTRRs. (See para 6–45*b*.)

The following information is required for Firm Test Requests (and can be tailored to reflect individual requirements):

Test item nomenclature (model number, lot number, short title, and acronym). Reflect the individual project title as identified in the Army Research, Development, and Acquisition Plan or other budgetary documents.
Item description. Identify unique characteristics that might require special test and analysis requirements. Include existing or planned systems with which the item will interface. State if a materiel change management program (citing MC number) or a Foreign Military Sales (cite FMS case number and country).
System life cycle phase. Identify the phase or the milestone decision review being supported by the test. State the ACAT designation and if the program is on the OSD T&E Oversight List, specifically for the Live Fire.
Funding. Type of funds to be provided (for example, R&D, procurement, OMA) and associated funding code (program element / task for R&D and OMA, standard study number for procurement).
References. Identify DTC project number if previously forecast and reference ORD, TEMP, SEP/EDP, and military specifications.
Description of test. Provide the test type, a brief description of the test, and test data required to answer preliminary concerns of the MATDEV. Include the appropriate test type as defined in DA Pam 73-1, paragraph 6-23. (NOTE: The requirement document can be provided to address these requirements.) Any additional pertinent documentation (for example, other test plans, specifications, MIL-STDs) that would assist in development of the scope of work should be referenced.
Test schedule. Include quantity of test items and delivery date (month and year). Provide any milestones requiring special consideration, such as required completion of testing, SER due date, and so forth.
Report requirements. Indicate type of report required (that is, test record, abbreviated report, or formal report) and distribution requirements. Include firing and Test Incident Report (TIR) requirements.
Administrative and technical points of contact. Name, organization, office symbol, telephone number, and email address.
Safety considerations. Address any safety problems and considerations concerning the test item. Provide a copy of the Safety Assessment Report (SAR). NOTE: Policy dictates that government developmental testing will not begin until a SAR has been received from the test sponsor and reviewed and accepted by the government organization performing the test (AR 385-16).
Environmental considerations. Cite any environmental considerations that might impact on the accomplishment of the requested effort and provide the appropriate documentation in accordance with the National Environmental Policy Act (NEPA) and AR 200-2 (for example, Record of Environmental Consideration, Record of Environmental Impact Statement, or Environmental Assessment).
Security considerations. Address applicable provisions of the security classification guide or security checklist and any applicable OPSEC requirements.
Requirements for standard/non-standard ammunition. State the requirements for ammunition.
Disposition instructions. Provide guidance on return or disposal of test items.

Figure 6–2. Firm developmental test request

6–26. Developmental Test Readiness Review working group

The DTRR working group, whose members include the core T&E WIPT members plus others as deemed appropriate, reviews all pre-test start activities and requirements that may impact the execution of the test as planned by the T&E WIPT. The objective of the review is to determine what actions are required to ensure resources, training, and test hardware will be in place to support the successful conduct of the test, and to ensure that T&E planning, documentation, design maturity/configuration, and data systems have been adequately addressed.

a. The DTRR working group is typically composed of the following representatives—

(1) MATDEV.
(2) MATDEV's Safety Office.
(3) MATDEV's ILS Office.
(4) MANPRINT representative.
(5) MATDEV's Product Assurance and/or Testing Office.
(6) CBTDEV/FP.
(7) Developmental Tester.
(8) Operational Tester.
(9) System Evaluator.
(10) Logistician.
(11) Trainer.

b. Others who may be requested to participate are—

(1) Foreign Intelligence Officer.
(2) HQDA (DCS, G–2)—Threat Integration Staff Officer (TISO).
(3) Transportability Analyst.
(4) OSD action officers.

c. The DTRR working group should be formed for all programs on the OSD T&E Oversight List. For programs not on the OSD T&E Oversight List, establishment of a working group is at the discretion of the MATDEV. In cases where a full DTRR is not conducted, the MATDEV should conduct a preliminary DTRR to assure that the item or system can successfully complete the planned testing.

6–27. Developmental Test Readiness Review procedures

a. The chairperson, after initial coordination with the membership, notifies and provides each member a DTRR package ensuring that all considerations (see fig 6–3) have been addressed. Figure 6–4 depicts a typical DTRR agenda. Notification of the time and location of the review plus the DTRR package should be provided at least 2 weeks before the review to allow members to determine the proper level of representation by their organization and to effect preliminary internal coordination. Member agencies will determine the extent of their representation. Since all representatives may not attend each review, the chairperson may indicate recommended attendance.

b. As applicable, the DTRR package consists of the following documentation:

(1) A T&E WIPT coordinated TEMP.
(2) SEP and, if required, developmental test EDPs.
(3) Developmental Tests and Detailed Test Plans (DTPs).
(4) Safety Assessment Report.
(5) Applicable environmental documentation.
(6) Current test hardware configuration.
(7) RAM assessment to include statement of best estimate for the current value of system reliability and likelihood of meeting RAM test objectives.
(8) RAM failure definition/scoring criteria.
(9) A statement of the status of the SSP.
(10) A statement of the status of NET.
(11) A statement of the status of MANPRINT.
(12) A statement of the status of instrumentation and data collection and reduction facilities.
(13) An ILSMT approved Integrated Logistic Support Plan (ILSP).
(14) An airworthiness statement.
(15) A statement on the status of software.
(16) Safety Release.
(17) DT Threat Test Support Package.

The following factors should be taken into consideration when preparing a DTRR package for a PQT for a program on the OSD T&E Oversight List. This list should be modified for programs not on the OSD T&E Oversight List, as required.

1. General - Compare the requirements document against test results to date. There must be a reasonable assurance (confidence) that the system to be tested can satisfactorily pass developmental test or equivalent independent government tests.

a. Previous data sources should indicate that system requirements could be met. (Consider quantities tested, what tests were conducted, and results.)
b. All system requirements must be addressed.
c. All critical / major problems identified in TIRs from previous testing should have been corrected and verified. (List and summarize corrective actions.)

2. Safety

a. A Safety Assessment Report (SAR) (AR 385-16) and a Health Hazard Assessment (HHA) (AR 40-10) must be submitted to the testing agency.
b. A System Software Working Group (SSWG) should have been formed.
c. System safety limitations (operational limitations for test personnel) should be identified, either inside or outside the required performance envelope. Corrective action should have been taken or be planned.
d. Critical defects found during manufacture/loading/inspection of the items should be identified.
e. A SSMP should be established.
f. The contractor should have established a System Safety Program Plan (SSPP).
g. All residual risks should have been identified and managed per AR 385-10 and AR 385-16.
h. Review of the USASC's Independent Safety Assessment prepared at each MDR.

3. Reliability, Availability, and Maintainability

a. Reliability and maintainability predictions should be included.
b. Reliability growth goals should have been met.
c. Critical components identified and component testing conducted.
d. An independent RAM assessment conducted.
e. Failure definition/scoring criteria established.

4. Configuration Management

a. A preliminary product baseline technical data package should have been established.
b. A configuration management plan should be in place, which includes provisions for Government approval of engineering change proposals and waivers/deviations.
c. A Configuration Control Board should have been established.

5. Electromagnetic Environmental Effects (E3)

a. Hardware conformance to the baseline evaluated. A physical configuration audit should have been conducted. Consideration should be given to how many items and the results.
b. Test item configuration should be compared with items previously tested.
c. Any unresolved risks should be identified.
d. Human factors evaluations should have been conducted.
e. Unique (nonstandard, new, or proprietary) manufacturing and/or functional processes identified.

6. Software

a. Configuration items related to software should have been identified and controlled.
b. All software test plans/procedures/test results should have been reviewed/approved by the Government.

Figure 6–3 (PAGE 1). Considerations in preparation for the Developmental Test Readiness Review

c. All functional requirements should be clearly identified.
d. Confidence that software functions will execute properly (walk-through, design specs, program performance specs, interface specs, resource allocations).
e. A clear understanding should exist of what software functions will be tested by the developmental and operational testers.
f. If applicable, the Computer Resource Management Plan should be current.
g. Plans should have been formulated to deliver all software documentation prior to DT/OT.

7. Test Documentation

a. The detailed test plan should address all critical technical parameters and be approved.
b. If required, the Human Use Committee should have approved the detailed test plan.
c. Airworthiness and Safety Releases should be provided and all recommendations complied with. [Rationale: Issuance of a Safety Release or Airworthiness Statement may require changes in system design. Workarounds and special operational procedures, training, to be implemented before the system is safe for soldiers' use and ready for test.]
d. Required environmental documents should have been received.
e. Instrumentation plans should be prepared and approved.
f. If required, an Outline Test Plan should have been prepared and submitted.

8. Integrated Logistics Support

a. Supportability.
(1) SSP Component List (SSPCL) prepared and coordinated with all concerned agencies. (See AR 700-127.)
(2) All items on the SSPCL available at each test site prior to test, or a waiver approved.
(3) All manuals (including drafts) available, including those for support equipment, associated equipment software, and TMDE.
(4) A logistics demonstration conducted.
(5) Testing for supportability included in the TEMP, OTP, SEP, EDP, and DTP.
(6) Field support equipment should be available for test.
b. Transportability Testing. System transportability needs should be identified (including such requirements as lifting and tie down provision strength, helicopter lift, Air Force aircraft loading, air drop, and rail impact).

9. MANPRINT

a. MANPRINT analyses conducted.
b. System MANPRINT management plan prepared.
c. Human factors engineering analysis accomplished.
d. Training.
(1) NET for test personnel accomplished prior to the start of DT.
(2) NET TSP prepared. (See AR 73-1.)
(3) Training devices, aids, and/or equipment needed by NET personnel available.
e. Soldier survivability should be addressed.

10. Test Resources

a. Required agencies should be funded for the test.
b. Unique facilities/equipment instrumentation required should be available at the test site(s).
c. Sufficient test articles must be available.
d. Sufficient targets and threat simulators should be available.
e. Required targets and threat simulators validated and accredited for this test.

11. Security Considerations

Status of DITSCAP accreditation.

Figure 6–3 (PAGE 2). Considerations in preparation for the Developmental Test Readiness Review—Continued

1. **Purpose**

2. **Program Sponsor Issues** (Program Sponsor)
   a. System Equipment Status.
   b. Results of previous testing and/or data sources.
   c. Safety Issues; Safety Release and Safety Assessment Report approved.
   d. System Delivery Schedules (Milestone).
   e. Contractors Support (if applicable).
   f. Logistics Support Plan.
   g. Test Instrumentation.
   h. Other Special Topics.

3. **Reliability, Availability, and Maintainability**
   a. Status of Independent RAM assessment.
   b. Failure definition/scoring criteria established/approved.

4. **Software**
   a. Configuration Management Plan in place.
   b. Preliminary product baseline technical data package established.

5. **Electromagnetic Environmental Effects (E3)**
   a. E3 criteria established and/or approved.

6. **Test Documentation (Developmental Tester)**
   a. TEMP coordinated/approved.
   b. System Evaluation Plan/Detailed Test Plan, and Test Operations Procedures (TOPs), (approval). Overview of the test design to include issues as appropriate and status of SEP development.
   c. Resources. Status of support required/received, unique facilities, special instrumentation available at the test site(s).
   d. Test Schedule
   e. Participation/Other Agencies (if applicable)
   f. Data Collection Reduction and Processing Plan
   g. Human factors and the status of the MANPRINT statement.
   h. Human Use Committee approval of the DTP, if required.
   i. Airworthiness statement, if required.
   j. Outline Test Plan approved, if required.
   k. Sufficient test articles.
   l. DT Threat Test Support Package available.
   m. Sufficient targets and/or threat simulators available.
   n. Targets and simulators accredited for this test
   o. Other Special Topics.

7. **Integrated Logistics Support**
   a. System Support Package completed.
   b. SSP Component List (SSPL) prepared and coordinated and SSPL items available.
   c. System transportability requirements and testing, identified.

8. **Discussion** (All)

9. **Decision** (Chairman)

Figure 6–4. Sample Developmental Test Readiness Review agenda

(18) Threat Accreditation Report.
(19) Status of Transportability Statement.
(20) DT Readiness Statement (for PQT or SQT only).

Note. See appendix U for the formats associated with these documents.

c. After coordination with all participants, the DTRR working group will be convened at the call of the chairperson.

d. The DTRR working group makes recommendations on all issues regarding T&E planning. Each representative has the responsibility to advise participating members in test matters considered to be of mutual concern.

e. In the event of disagreement among the members, issues are presented to the chairperson for resolution through normal command/staff channels.

f. The chairperson provides minutes of the DTRR that include a Developmental Test Readiness Statement (DTRS). This statement verifies that the system is ready for developmental testing, or if there are action items identified during the review that must be satisfied before test can begin, the minutes will identify such actions. The materiel developer will ensure that all requirements are satisfied before the test begins. The minutes, including all recommendations, issues, and required actions are distributed to each DTRR participant ten working days after the DTRR.

6–28. Developmental Test Event Design Plan

Guided by the SEP, the EDP states the data required and any special test analyses procedures for the system evaluation. The EDP is prepared by the system evaluator and coordinated with the T&E WIPT. It provides explicit instructions for the conduct of developmental tests and subtests. It is coordinated with the MATDEV and approved by the test organization's parent command. For a system contractor-conducted DT, the MATDEV approves the EDP.

a. The EDP addresses all DT parameters and reflects all program constraints (such as, dollars, test quantities, schedules, and issues). As a minimum, the EDP should address the test objectives, test concept/methodology, system description (to include component-level or system-level), test personnel requirements, test criteria, test schedule, and required coordination. In addition, the EDP must spell out the form in which the data are needed and the accuracy with which they must be measured.

b. Each subtest should be addressed separately, stating the criteria to be addressed by the subtest, the data to be obtained during the test, the procedures to be used, and data presentation (that is, statistical methods and confidence levels). The procedures should be described in sufficient detail to reflect what will occur during the test. Performance standards and test operating procedures (TOPs) should be used, if possible, and referenced in the EDP. The EDP for LFT&E is coordinated with the members of the LFT&E WIPT.

c. The EDP will also contain the appropriate reliability test strategy, sample sizes, design of tests/experiments, minimum test requirements to measure performance specified, requirements for data and the process by which the data will be verified, and identify tests in order of priority to ensure that the more critical data are generated early.

d. The Live Fire Test EDP provides further detail on the critical issues developed in the LFT&E TEMP strategy (see app J). The SEP provides the crosswalk between the live fire critical issues and the data sources. The LFT EDPs define the data requirements and data sampling plan and analysis techniques are specified to ensure the logic of the evaluation is understandable. As a minimum, the LFT&E EDP should contain the following—

(1) A cover page providing the name of the system, the activity/agency responsible for preparation of the plan, date, classification, and applicable distribution statement.

(2) A coordination sheet containing the signatures of the approval authorities.

(3) Administrative information: name, organization, telephone, and e-mail addresses of key LFT&E personnel.

(4) Description of threat weapons or targets that the system is expected to encounter during the operational life of the system, and the key characteristics of these threats/targets which affect system vulnerability/lethality; a reference to the specific threat definition document/authority; discussion of the rationale and criteria used to select the specific threats/targets and the basis used to determine the number of threats/targets to be tested and evaluated in LFT&E.

(5) If actual threats/targets are not available, then the plan must describe the threat/target surrogate to be used in lieu of the actual threat/target, and the rationale for its selection.

(6) A statement of the test objectives in sufficient detail to demonstrate that the evaluation procedures are appropriate and adequate.

(7) A description of the shot selection process. Describe the process to be used to establish the test conditions for randomly selected shots, including any rules (exclusion rules) used to determine whether a randomly generated shot may be excluded from testing. For engineering shots (for example, shots selected to examine specific vulnerability/lethality issues), describe the issue and the associated rationale for selecting the specific conditions for these shots. List the specific impact conditions and impact points for each shot, and whether it is a random or engineering shot.

(8) A description of data requirements for each LFT test.

(9) A description of the analysis/evaluation plan for the Live Fire program from the SEP. The analysis/evaluation

plan must be consistent with the test design and the data collected. Indicate any statistical test designs used for direct comparisons or for assessing any pass/fail criteria.

6–29. Developmental test incidents and related reports

Timely reporting of test results is essential and is accomplished through Test Incident Reports (TIRs) as well as the formal test reporting procedures. Test incident data are prepared by the test organization (Government or contractor) to provide the results of any incident occurring during testing that may assist in explaining the test data. In response, as a minimum, the MATDEV prepares corrective action data for all critical or major TIRs. Corrective action data reflect the developer's analysis of the problem and the status or description of the corrective action. All data are put into the ATIRS to enhance the continuous evaluation of the program. ATIRS is administered by the Aberdeen Test Center of ATEC's DTC at Aberdeen Proving Ground, Maryland. Details of test incidents and related reporting are contained in appendix V.

6–30. Developmental Test Detailed Test Plan

The DT Detailed Test Plan (DTP) is prepared by the developmental test activity. It is based on the SEP and EDP, if available, and provides explicit instructions for the conduct of the DT.

a. Coordination. The DTP is coordinated with the system evaluator and may be coordinated with the T&E WIPT to ensure that the test data meet the requirements of the TEMP. The DTP is approved by the test activity's parent command; if a contractor-conducted test, the DTP is coordinated with the system evaluator and then approved by the materiel developer.

b. Content. The DTP governs test control, data collection, data analysis, and the necessary administrative aspects of the test program. As a minimum, the DTP should address the objectives, test concept, system description, test personnel requirements, test criteria, test schedule, and required coordination. Each subtest is addressed separately. Performance standards and test operating procedures may be used and referenced in the DTP.

c. Live Fire Detailed Test Plan. For specific guidance on the LF DTP, see appendix S.

6–31. Developmental Test Report

For T&E WIPT-coordinated DT, the Test Report (TR) is provided by the test agency (either contractor or Government) to T&E WIPT members and the decision review body at the conclusion of the test. For extended test phases, an interim test report may be submitted for interim reviews. Test results must be comprehensive and complete before presentation to the MDA. DT performed to support efforts not involving the T&E WIPT will report test results to the test sponsor according to the test sponsor's requirements.

a. As a minimum, final draft test reports, authenticated by the test agency, are required prior to decision reviews. This is in consonance with policy regarding other documentation supporting the acquisition of a weapon system. The T&E WIPT should conduct a review 30 days prior to the decision review to review the adequacy of past tests, test results and evaluations, planning for future testing, and the modification of test strategy to accommodate the evolving acquisition strategy. Issues not resolved in this forum will be elevated to the IIPT, OIPT, and, lastly, the DUSA(OR). The test activities that conducted the developmental tests prepare, approve, and publish the test reports. Test reports for contractor-conducted developmental tests are approved by the MATDEV.

b. The format of the formal TR parallels that of the DT DTP. An executive digest provides a summary of the significant findings, the test objectives and concept, and a description of the test item. Subtest results include, in addition to the objectives, criterion, test procedures, test findings, and a technical analysis of the data that relate to each subtest criteria addressed. Appendices include the test program criteria (from the DT DTP), and if required, lengthy test data presented as tables, charts, and illustrations. The formal test report may include a preliminary determination of deficiencies, shortcomings, and suggested improvements.

c. For live fire testing of ACAT I programs and other Live Fire OSD T&E oversight programs, the developmental tester must submit the developmental test reports to OSD (DOT&E) through the DUSA(OR). If the test report is not available, an interim report will be submitted. Guidance for preparation of the Final Test Reports for FUSL Live Fire Tests is provided in appendix S.

6–32. Testing for climatic suitability and effectiveness.

Materiel developers plan for realistic testing in accordance with system Life Cycle Environmental Profiles, as presented in MIL–STD–810F, Test Method Standard for Environmental Engineering Considerations and Laboratory Tests. Systems will be tested for their ability to remain safe, effective, suitable, and reliable in those environments where they will be operated, handled, transported, and stored. Natural field environments, representing all of the various climatic design types described in AR 70–38 are available at ATEC test centers.

a. Testing in climatic chambers. Prior to testing in natural environments, materiel developers plan for simulated environmental testing in climatic chambers unless impractical. Results of climatic chamber tests may be used to determine if a system will not satisfy its performance requirements. Chamber tests may also be valuable in assessing the risk associated with not conducting tests in the natural environment. Causes for failures in simulated environments must be resolved before the system is subjected to natural environment testing. Chamber tests and simulations play a

significant role in the beginning of the development cycle, but must be integrated with testing conducted in real world, natural environments. Test results from climatic chambers cannot be interpreted as a total substitute for tests conducted in the natural environment, because they do not provide the synergisms associated with the natural environment.

b. Testing in the natural environment. Materiel developers will test, as a minimum, in the basic design types (see para 6–33) to ensure the system will be subjected to the synergistic effects those natural environments provide. The effects of many environmental variables can be seen at once and mission profiles can be followed. Data derived from these tests will be used to evaluate suitability and effectiveness. Potentially dangerous systems (for example, ammunition) will be tested to all climatic design values regardless of their requirement to operate in those climates. Therefore, a level of risk exists that a system may meet all of its operational requirements, but not be suitable for fielding. See appendix W for details on survivability testing.

6–33. Basic climatic design type

a. Per AR 70–38, the Army recognizes four Climatic Design Types: hot, basic, cold, and severe cold. Generally, Army systems must be designed IAW the operational requirements. Thus, systems operate in and are designed, as a minimum, for the Basic Climatic Design Type. Some systems may require testing in the more severe climatic design types if their Life Cycle Environmental Profiles (LCEP) (see MIL–STD–810F) identifies potential exposure to them. The Basic Climatic Design Type has four daily weather cycles as depicted in table 6–1.

Table 6–1
Basic climatic design type

Daily cycle	Ambient temperature (degrees F)	Solar radiation (BTU/FT^2 per hr)	Relative humidity (%)	Storage temperature (degrees F)
Basic Hot	86–110	0–355	14–44	86–145
Basic Cold	-5 to -25	Negligible	Toward Saturation	-13 to -28
Tropic (Constant High Humidity)	75 (constant)	Negligible	95–100	80 (constant)
Temperate (Variable High Humidity)	78–95	0–307	74–100	86–145

b. Other environment factors (both natural and induced) must be taken into consideration during testing. The natural environment factors are listed at table 6–2.

Table 6–2
Environmental factors

Natural factors	Induced factors
Terrain	Atmospheric Pollutants/smoke
Animal life	Vibration
Humidity	Acceleration
Solar Radiation	Blast pressure
Ozone	CB contamination
Wind	Laser emissions
Salt, Salt Fog, and Salt Water	Sand and dust
Microbiological Organisms/Mold	Shock
Vegetation	Acoustics/noise
Temperature	Electromagnetic Radiation
Pressure	Nuclear Radiation
Rain	RF emissions
Fog and Whiteout	Acidic atmosphere
Solid Precipitation	
Microbiological Organisms	
Lightning and Static Electricity	

(1) While it is necessary to recognize the importance of individual natural environment factors, it is equally, if not more important to recognize the combined effects of related environment factors. These factors may interact to produce effects on materiel different or more severe than the sum of the effects caused by individual factors acting independently. The relationship among the various individual environment factors and the four weather cycles can be found in AR 70–38.

(2) The prime example of combined factors that are often forgotten in the design of equipment is the effect of high temperatures and solar radiation. AR 70–38 indicates that the maximum high temperature is 110 ^{o}F, and many designers use this as the basis for their designs. What may be forgotten is an item that is painted camouflage colors may absorb as much as 360 BTU of solar radiation per square foot of exposed surface/per hour, which will significantly raise both internal and external temperatures.

(3) The natural environment factors experienced by equipment in a given time or place are related to the protection provided. An example of this would be the difference in materiel exposed to ambient climatic factors resulting from open storage versus environmentally controlled storage.

c. Induced environment factors are mixed in their relationship to natural factors as some are strongly related in their effects on materiel and some are virtually independent. See table 6–2.

(1) Since induced factors are generally independent, they can be tested in laboratory or chamber conditions using approved procedures such as those described in MIL–STD–810F and under environment conditions described in AR 70–38. For example, the effect of vibration can be quickly and accurately tested under controlled conditions instead of having to transport and handle the item for long periods of time.

(2) The opposite is true for natural environment factors. Chamber tests can only assist in the development of an item and are not a substitute for the real world environment because of the interaction of the natural factors.

Section III
Operational Testing (OT)

6–34. Overview of operational testing

The primary objective of OT in support of the acquisition process is the verification of operational goals and objectives, generally defined by the COIC. The structuring and execution of an effective OT program is absolutely essential to the acquisition and fielding of Army systems that are operationally effective, suitable, and survivable while meeting the user's requirements. There are many elements integral to a successful OT program. This section provides procedural guidance in the following areas:

a. Planning, executing, and reporting OT for material and C4I/IT and space systems.

b. Addressing RAM, ILS, MANPRINT, threat, survivability, compatibility, interoperability, and M&S in support of OT.

6–35. Operational test objectives in support of the materiel and tactical C4I/IT systems acquisition process

OT is conducted in a realistic environment on all systems with typical users (that is, soldiers and civilians) in as realistic an operational environment as possible. OT uses personnel (that is, operators, maintainers, and administrators) with the same skills and training as those who will operate, maintain, and support the system when it is deployed. A realistic operational environment includes tactical operations conducted in accordance with the system's wartime OMS/MP, which specifies the number, type, and frequency of combat operations during a period of time. The scenarios used in OT should use the TTPs, doctrine, logistics, training, and maintenance support concepts planned for use when the system is fielded.

a. The OT threat represents threat systems capabilities and threat tactics and doctrine postulated at post-fielding. The environment for these operations may include—

(1) The employment of opposing forces.

(2) Electronic and other enemy countermeasures.

(3) Simulated NBC warfare.

(4) Smoke and other forms of battlefield obscuration.

(5) Terrain and weather.

b. OT can provide data not obtainable through other sources. It is applicable for all development systems, commercial items, NDI, and product improvements, unless waived (see AR 73–1) or not required by the TEMP or the approved AS.

c. OT may provide data useful for the development or refinement of the JMEM that will accompany the system at initial operational capability, and may provide an opportunity to evaluate a draft JMEM if one has been developed prior to OT/IOT. In any event, consideration should be given to JMEM requirements during OT planning and execution.

6–36. Origin of operational test requirements

OT requirements result from the OSD Joint T&E Program, multi-Service and Army TEMPs, CEPs, and MATDEVs and CBTDEVs with special testing needs (customer tests). OT planning, documentation, resource identification, and execution are conducted through a variety of means. Committees and working groups (such as, OSD JT&E and Joint Feasibility Study, T&E WIPTs, Army TSARCs, ATEC OTRRs, and SMDC's T&E Center and test directorates) support the overall process and aid in OT event coordination.

6–37. Operational test types

a. An early user test (EUT) is a generic term encompassing all system tests employing representative user troops during concept and technology development or early in system development and demonstration. The purpose of EUT is to test materiel concept, support planning for training and logistics, identify interoperability problems, and identify future testing requirements. EUT provides data for system evaluation supporting the MS B or MS C decision. FDT/E or concept experimentation program (CEP) may comprise all or part of EUT. An EUT is conducted with RDTE funds. An EUT uses procedures described for IOT, modified as necessary by maturity and availability of test systems and support packages. EUT seeks answers to known issues that must be addressed in the SER.

b. A limited user test (LUT) is any type of RDTE funded OT, other than IOT, normally conducted during systems acquisition in support of the LRIP decision. LUT addresses a limited number of evaluation issues and is used to accomplish the following objectives—

(1) Testing necessary to supplement DT before a decision to purchase long-lead items or at MS C.

(2) Testing necessary to verify a fix to a problem discovered in IOT that must be verified prior to the production decision (for example, problem is of such importance that verification of fix cannot be deferred to FOT).

(3) As needed to support NDI or modifications that may not require a dedicated phase of IOT before a production decision.

(4) A LUT will not be used to circumvent requirements for IOT before a production approval decision as prescribed by statute, DOD directives, and AR 73–1.

(5) A LUT will not be used to piece-meal IOT through a series of limited objective tests.

(6) A LUT can be conducted post-IOT to address recurring modifications to software.

c. An initial operational test (IOT) is an operational test that is conducted to support the FRP DR. IOT for developmental systems includes all system components, such as hardware, associated support packages, ground support, computer software, training, TMDE, and all systems with which the system under test must operate. Waiver requests for IOT must be supported by plans and schedules for obtaining relevant data from other sources. IOT is characterized by—

(1) Use of production-representative systems.

(2) Organizational units, tables of organization and equipment (TOE) units, provisional units, or elements typical of those that will employ and support the system and have received soldier and leader training planned for the system when initially deployed.

(3) Employment under realistic simulated combat conditions equivalent to those expected during the IOC timeframe and against the threat postulated for the system's deployment. The threat capabilities are normally representative of those projected for IOC plus 10 years. The T&E WIPT will determine the appropriate post-IOC timeframe for which the threat needs to be represented in the IOT.

(4) Traditional weapon system OT requires the entire system to successfully complete OT of production representative items before fielding. The strategy allows fielding of parts of software intensive systems, once successful OT of a representative sample has been accomplished.

d. A follow-on operational test (FOT) consists of the following—

(1) Conducted after a system enters FRP. FOT is conducted to ensure that production items remain operationally effective, suitable and survivable, validate corrections to identified operational deficiencies, verify corrections of training and logistical deficiencies, and resolve issues remaining after the FRP DR. FOT is conducted on production items using the IOC or other applicable units.

(2) System evaluator should minimize the need for FOT by making maximum use of other data sources. As much as possible, FOT uses current and complete system support packages, organizational structures, employment doctrine, support requirements, threat, C3I, tactics, training, and interfaces with other systems.

(3) System evaluator tailors the extent of the FOT to answer the issues resulting from the IOT or new issues from the acquisition community. The FOT may be conducted either in the same manner and depth as an IOT or it may be conducted for limited objectives in the same manner as a LUT or a FDT/E.

e. A customer test (CT) is a test conducted by a test organization for a requesting agency external to the test organization. The requesting agency coordinates support requirements and provides funds and guidance for the test. It is not directly responsive to Army program objectives and is not scheduled or approved by the TSARC.

6–38. Operational testing of non-tactical C4/IT and space systems

a. OT of all non-tactical C4/IT and space systems will be conducted in a realistic operational environment, using troops or assigned civilians from representative units or organizations, and incorporating the approved threat.

b. A supplemental site test (SST) may be necessary for those systems, which execute in multi- hardware and - operating system environments. The SST supplements the IOT and UAT.

c. IOT in support of a FRP DR is called an IOT. Between FRP and system retirement, testing is called PDSS for C4I/IT systems.

d. A user acceptance test (UAT) may be conducted by the functional proponent or CBTDEV. It is limited in scope relative to a FOT and serves primarily to verify the functionality of the changes to the non-tactical C4/IT system in the user environment.

6–39. Operational test planning

When a test activity is assigned responsibility for execution, OT planning begins. Planning includes development of the overall test design and documenting the actions required to provide the data to address system evaluation requirements or to answer customer requirements. These events may be in support of an Army acquisition program, concept experimentation, FDT/E, ACTD or other events such as CTs.

6–40. Operational test planning process

The OT planning process generally consists of the performance of a variety of functional area requirements that may vary significantly dependent upon the type of test. Tests and experiments will normally require most, if not all, of the functions to be performed. Other events, such as market investigations or M&S activities may require performance of only a subset of the areas. The overall planning process follows a logical sequence of functions:

— Identifying event requirements from appropriate sources;
— Developing the design for the event;
— Identifying event control and scenario and/or test schedules, as well as data management, training, resources, instrumentation, administrative and logistical, and other appropriate requirements for the event.

a. Performance of these functions generally falls into phases consisting of preliminary analysis and planning, test design, and detailed test planning procedures. The results of preliminary analysis and planning and test/event design are documented in an event planning document, either an EDP, Test Plan (TP), or DTP depending on the type of event and test activity performing the event. The results of detailed test/event planning procedures are documented in the executing command's event execution plan that contains the details required for day-to-day event execution.

b. The core element of event/test planning is the development of the event design.

(1) The event design process identifies the independent, dependent, and uncontrolled variables; the treatments of the independent variables to produce the desired effect on the dependent variables to generate required test data under the appropriate conditions; and required numbers of executions to provide desired level of confidence in test results. An additional consideration is the overall event methodology for any comparison purpose. This methodology may be comparison of a new system to a baseline or to specific standards, performance of an organization with the system to an organization without the system, or just to obtain specific data pertaining to elements of system design or performance requirements. The conditions under which the event is to be conducted also greatly impact event design. Simulation of operational combat conditions and tactical operations may require greater degrees of event design than for other types of events. The degree of detail of event design may vary significantly dependent on the type of event, number of independent variables, and event environment requirements.

(2) Certain requirements for event design may be met by predetermined standard operating procedures that do not change significantly from system to system. Other event design requirements may necessitate the creation of a complex event design involving player forces, real time casualty assessment (RTCA), and considerable operational environment simulation from event source material. These requirements, singly or in combination, occur for many OT events. Regardless of the methodology and degree of depth required for the design, core event design forms the basis for all other event planning requirements.

(3) Event designs are clearly and comprehensively described in the event planning document. The event design should provide the overall methodology and design for conduct of the event. Essential information should be shown in a format that most clearly shows what is to be performed and how it will be performed. Overviews of phases, expected or required sample sizes, and organization of trials in accordance with the various combinations of independent variables should be shown in tabular or graphic form that provide for best understanding of the information. Descriptions of other key information should be structured to "paint the picture" for the decision-maker and other readers. Clear understanding of the design is critical for all personnel and will ultimately lead to a better-executed event.

c. In general, the event planning process is conducted as depicted in figure 6–5. While a number of sources are shown as inputs to the overall process, many other potential sources exist for specific types of events or for unique event requirements. Event planners must consider all identified sources in determining overall requirements to ensure the event results in usable and creditable information for the overall purpose. The results of the planning are

documented in the EDP, DTP, or TP. If required, an event execution plan is also used for documentation of day-to-day actions. Resource requirements for OT (and DT requiring soldiers) are normally documented in the OTP. (See AR 73–1.) Requirements for ATEC resources for events other than OT (or DT) are documented in the ATEC Decision Support System (ADSS) (https://adss.atec.army.mil/). Requirements for SMDC T&E resources are coordinated through the SMDC's T&E Center, Huntsville, AL, DSN: 645–2742 or 2736, commercial (256) 955–2742 or 2736.

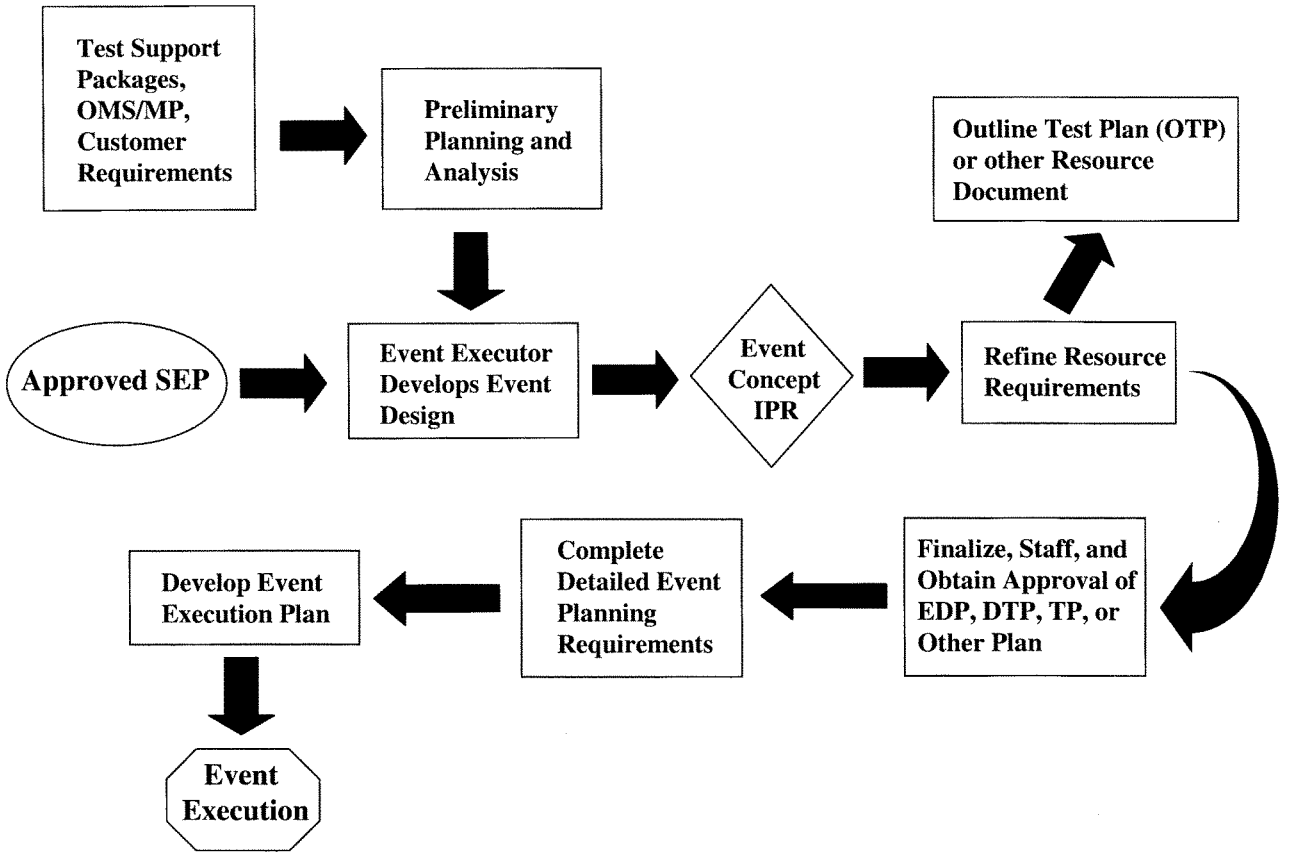


Figure 6–5. Event planning process (repeated for each event)

6–41. Operational Test event planning documentation

a. An EDP is prepared to document planning actions for an event or combination of events identified in the SEP as needed. The EDP documents the test design, supporting methodology, and analytic details required for the specific event when the information is not contained in the SEP. All OTs and combined DT/OTs will have an EDP. Integrated DT/OT may prepare a separate plan or combine plans into a single document.

b. As appropriate for the level of planning, an event execution plan (generic term) containing the necessary details for day-to-day execution of the event will be prepared. The EDP, when required, along with the event execution plan, will document planning for assigned events in accordance with the executing command's policies. An event execution plan may be ATEC's OTC Event Design Plan, DTC's DTP, or DTC's TOPs or ITOPs. The test command will tailor the procedures and documents consistent with the ACAT of the system, the SEP or customer requirements.

c. Executing commands for OT events (and DT events requiring user test personnel) will prepare an OTP documenting event resource requirements. The OTP will be submitted through the Army TSARC process for resource approval and required tasking actions (see AR 73–1). Commands may use the Resume Sheet (RS) for documentation of resources that do not require TSARC review. The OTP will be fully coordinated with the T&E WIPT to advise resource providers of the estimated T&E support requirements.

d. The T&E activity team develops EDPs in coordination with the T&E WIPT for assigned acquisition program events. The operational test organization leads the development of EDPs for operational tests. The assigned executing

command solely develops plans for all non-acquisition program related events, such as a CT, CEP, or non-system related FDT/E.

e. The EDP for events that are not directly in support of an acquisition program are approved by the executing command.

f. Event execution plans do not require formal staffing and approval outside of the executing command. For acquisition program events, if requested, the OT execution plan will be made available to T&E WIPT members for reference and information during the event planning to assist in understanding of overall event requirements.

6–42. Operational events

Operational events can generally be defined as those OT and experimentation events conducted to support Army acquisition program requirements and other events; whether test, experimentation, or exploratory; that are conducted in simulated operational or combat environments with typical user troops and, as appropriate, representative material. The key difference of an operational event from other types of events is the employment of typical users operating the system under test in the environment under which the system is expected to operate when deployed.

a. The T&E activity teams may provide input for or participate directly in the planning for operational events for acquisition programs. However, the majority of the planning requirements for these events and for non-acquisition related operational events are conducted by the T&E activity test directorate.

b. Operational event planning will require actions in many areas due to the nature of simulating an operational environment and conditions. Some of these actions will address how to simulate the expected operational environment; integration of the system within a user organizational structure; and integration of new TTPs for operation of the system. Other actions may require planning for training of typical users to operate the system and logistical support of the system during the event. Data generation and collection requirements may require identification of new or modified instrumentation for simulation or stimulation of the tested or supporting system(s) as well as event scenario and control requirements. These and many other actions are necessary to ensure proper event execution that provides credible and usable data to address the evaluation or other customer requirements.

c. The event summary and overall methodology is developed to provide the upper level logic behind the event and how the event will be structured and controlled for generation and collection of data. It identifies the overall design for employment of the system under test and sets the basic parameters for all subsequent planning. There are three basic comparison designs that can be used:

(1) *New versus existing.* When a new system or concept is replacing an existing system or concept the design should be based on a comparison of both systems performing against the same measures and in the same environment. If data are available that shows how the existing system performs against the measures in the required environment, the system evaluator must determine the adequacy of the data and whether additional testing of the existing system is necessary.

(2) *With versus without.* A comparison is made of the unit or organization operating and accomplishing its mission with the system and without the system.

(3) *New versus predetermined standard.* In some cases the standards defined for the system are clear and may be used as the basis for comparison. The new system is tested to see if it meets the predetermined standard.

6–43. Event design

Determining the event duration and sample size required for collection of the required quantity of data is often a difficult process. It requires both an adequate knowledge of the system or concept under test and detailed information on data requirements, environment to be simulated, and player force structure and mission requirements. Event duration and sample size must be based on the minimum amount of testing required to provide data to support customer requirements to reach definitive conclusions concerning the system or concept under test. As such, sample size and event duration requirements are usually derived using a combination of statistical procedures and military judgment.

a. The following paragraphs describe the process for identifying the event factors and conditions that lay the foundation for developing the event design, sample size, and event duration requirements.

(1) *Event variables.* Event variables (factors and conditions) are three types of event variables (often referred to as event factors)—independent, dependent, and uncontrolled. During events, all three types of variables assume discrete values (or conditions). It is the tester's responsibility to control the independent variables in order to measure the response in the dependent variables. Event trial matrices result from combinations of the independent variables that constitute a condition for which data are needed. The data collected under that condition constitutes the dependent variables—the information needed for subsequent system evaluation. An uncontrolled variable is one that is not selected or cannot be controlled by the tester; however, it may have a significant effect on the dependent variable. One of the primary considerations in designing an event is to minimize and/or document the effects caused by extraneous variables.

(2) *Test controls.* The operational tester develops the initial list of event variables and during event planning adjusts the factors and conditions based upon the data required for answering the event issues, criteria, and measures. Factors are controlled in one of four following ways:

(a) Tactically varied factors enhance event realism because the conditions develop as a result of tactical operations employed in the event.

(b) Systematically varied factors are used to permit examination of all required factors in sufficient quantity for effective analysis. The tester establishes the values that the systematically varied factors will obtain during the event. These are normally the independent variables that the test combines to create specific operational situations under which data must be collected.

(c) Factors are held constant for the test when prior knowledge or testing indicates a preference, or no other option for that factor is available.

(d) Uncontrolled factors should be held to a minimum. When critical factors for a system are identified, the most representative conditions for that factor are developed into the event matrices with the number of conditions held to a minimum.

(3) *Combining conditions.* The selected set of test conditions is used to determine what combinations of conditions are appropriate. For example, a hypothetical system's target detection capability could be influenced by three training level conditions (untrained, average, and highly proficient), three weather conditions (that is, clear, overcast, and precipitation), and two terrain conditions (that is, flat and mountainous). This situation would require consideration of 18 possible test combinations (3 x 3 x 2=18). The radio communications capability of the hypothetical system could require consideration of training and terrain conditions (3 x 2=6 combinations) because weather conditions have little effect. A suggested technique is to draw a matrix listing possible combinations that interact and influence system performance. Normally, systematically varied controlled factors form the basis of this matrix.

(4) *Number of required trials.* The number of required trials for a phase is normally dictated by statistical requirements to answer issues, criteria, or measures. The required sample size is determined numerically by defining statistical parameters and formally calculating the sample size. The system evaluator and operational tester may apply military experience and judgment in determining the total number of trials required when resources or other limitations do not allow for a true statistical sample size. Where there are no statistical criteria, the system evaluator and operational tester must determine how many test trials are necessary to average out chance differences between repetitions of specific events. Essentially, this process determines how many repetitions are required to provide confidence that the event results are valid and representative of a true operational environment. If necessary, the operational tester should document any event limitations resulting from inadequate sample sizes in paragraph 1.5 of the EDP. A trial matrix is developed for each phase or set of requirements to show the number of iterations necessary to achieve the desired level of data collection for each phase.

b. Event planning must always consider the requirement to balance event realism and event control. Test designs that do not include the capability for possible degradation of system performance due to realistic conditions of employment fail to address a critical decision area and can seriously reduce the value of the test results. Event realism comes from scripting the events to follow the OMS/MP and the approved Doctrine and TTPs. Event realism is enhanced when the players, friendly and threat, are allowed to respond to the natural battlefield conditions. However, in order to answer the COIC and AI, the event executor must be able to collect the data, which requires that a certain amount of control be maintained during the event trials. The conditions for test environments will normally fall into one of following three categories of operational realism:

(1) *Maximum.* This type of event requires simulation of a tactical environment. A scenario is developed that merges the event trials and activities into a realistic and believable sequence. The scenario describes the actions of all player and Opposing Forces (OPFOR) units and includes all information that will be presented to the players. This type of realism is maintained by including initial and updated briefings for friendly and threat force players through operations orders, fragmentary orders, intelligence summaries, messages, and other information designed to evoke player response. Scenarios are based on standard TRADOC scenarios or other scenarios as specified. The particular scenario to use is agreed upon by the system evaluator and operational tester and the system proponent. In preparing the scenario it is essential to specify the time and location of each planned trial or activity. Once trials begin, there is limited intervention by controllers.

(2) *Limited.* When events do not require maximum operational realism, the preparation of a scenario may be unnecessary. It is, however, necessary to develop a detailed description of the events that will occur. The description should be sufficiently detailed so that the trials or activities can be executed without additional information. For each, the method, time, location, participants, and information to be provided must be specified. Mission event or execution lists may be used to ensure that the required amount of realism is maintained and that the required data are being collected.

(3) *Minimal.* This type of realism may be appropriate for customer tests. Although little realism is simulated in this type of event, there is need for the event executor to maintain close supervision through frequent checks to ensure that the user is properly employing the item or concept. For these tests, this section describes the frequency of checks and inspections and the areas to be checked.

c. Event control procedures must be developed to ensure that the event can be properly organized and executed to generate the required event data. Control procedures vary as to the type and need. For events that have limited or maximum tactical realism, detailed control procedures are normally required to ensure that specific tactical operations

occur, both friendly and OPFOR units begin and generally conduct operations as required, and instrumentation and simulation or stimulation devices are operating as required. Other control procedures may address placement and recovery of data collection personnel, visitor access, logistical support requirements, and other similar items. Regardless of the type of event, necessary control procedures must be identified by event planners and implemented during event execution to ensure that the execution proceeds in accordance with the test design requirements. A control plan is usually developed to identify the specific control measures required and to identify those personnel and situations in which a specific measure must be implemented. This plan normally is included in the event planning documentation.

d. The collection of event data through the use of automated instrumentation systems is a key factor in the majority of events. In addition, instrumentation systems that use M&S are often employed to provide realistic simulation of combat environments (weapons simulator, NBC stimulants, C4I stimulator) and to generate data for systems to use in lieu of having actual forces in the field (combat simulations and stimulation).

(1) *Instrumentation.* Instrumentation planning is conducted to identify those instrumentation systems that are required to collect data to address the event issues and/or to provide the necessary degree of combat environment realism or generation of cue and/or task loading information. The tester identifies the detailed requirements for instrumentation support through the overall data requirements process, test control procedures development, and data collection and reduction planning. The operational tester identifies instrumentation, M&S, and stimulation requirements early to ensure time to procure long-lead items.

(2) *M&S and stimulation.* The use of models and simulations is highly recommended and emphasized in operational events. Employment can be used for reducing costs, providing or enhancing test design, predicting results for comparison with field results, providing simulation or stimulation of systems and organizations that cannot be actually present, and assessing areas that cannot be fully tested. However, there are two restrictions on use:

(a) M&S data cannot be the sole source for production decisions in lieu of operational testing.

(b) All M&S must undergo VV&A prior to use. Simulators, emulators, drivers, and stimulators that are used to fully workload systems under test are included in this category. Threat simulators are a separate category but must also be approved and certified for use.

e. The analytic approach is the methodology by which the event data will be collected and processed to address the event requirements. The methodology must include elements of the following areas: independence (that is, free from bias as possible), comprehensiveness (that is, covering effectiveness, suitability, and survivability to the appropriate level), credibility (that is, believability since a report that is ignored has limited value), validity (that is, addresses the system's mission accomplishment in an operational environments), accuracy (that is, stating the evidence as found), and clarity (that is, getting to the point while not being robust). The methodology for the analytical approach will address the following items:

(1) The methodology is developed based upon the overall product that is required for the customer and is tailored for each event as appropriate. For example, for an oversight system, the event could produce a level 3 authenticated event database that would result in a Test Data Report (TDR). In this case, the event executor would not be responsible for data aggregation at the criterion and issue levels and the analytic approach methodology would focus on how the event executor plans to combine the different sources of data generated during the event into the authenticated test database. For a non-OSD T&E oversight system or for a non-acquisition program event, a Test Report that provides assessments or evaluative information may be produced. In this case, the tester may have the responsibility for aggregating data at the measure, criteria, or issue level to address the customer requirements. In this case, the tester would describe the methods for aggregating the data at the criterion or issue level to address the criterion or issue questions.

(2) The major areas of discussion for the methodology will center on the requirements for the specific issues, criteria, and measures assigned to the event. The tester must be able to explain the relevance of the measures with respect to the criteria and issues and develop the appropriate data collection, reduction, and aggregation methods. Measures must be clearly defined, including unique terms, factors and conditions, and data elements identified. Formulas must also be developed and any deviations from standard formulas identified.

(3) The data collection and reduction procedures required to answer a measure are a function of the degree of precision established for a given measure. Some measures will require input from several sources in order to provide the data to answer the measure. Data from instrumentation, 1553 data bus records, and manually collected data may be combined before the measure can be answered. In other cases, the measure may be answered by a single source of data, for example, a questionnaire provided to the test players. The objective of the data collection, reduction, and aggregation paragraphs under each measure is to provide a clear explanation of how the data is collected, reduced or merged into a data set, and aggregated at the conclusion of the event.

f. Data management planning must address all aspects of requirements for the organization and procedures for data collection and reduction efforts, the critical data process descriptions, DAG requirements, if any, JMEM data requirements, and the event database.

g. Pattern of Analysis (PA) is a major element in operational event planning. It provides the transition between the measures contained in the approved SEP to the identification of the actual data elements required to calculate and identify a response for the measures. The PA is required for all OT events and becomes an appendix to the EDP. Thus, it is staffed, approved, and distributed as part of the overall requirements for the EDP. The PA is normally prepared in dendritic format and depicts in hierarchical format the relationship of COIC and AI into measures and related specific

test and/or evaluation questions, data requirements (additional related questions) and/or data elements. The PA can be displayed in narrative terms or graphically and is normally developed by the event executor. (See fig 6–6.)

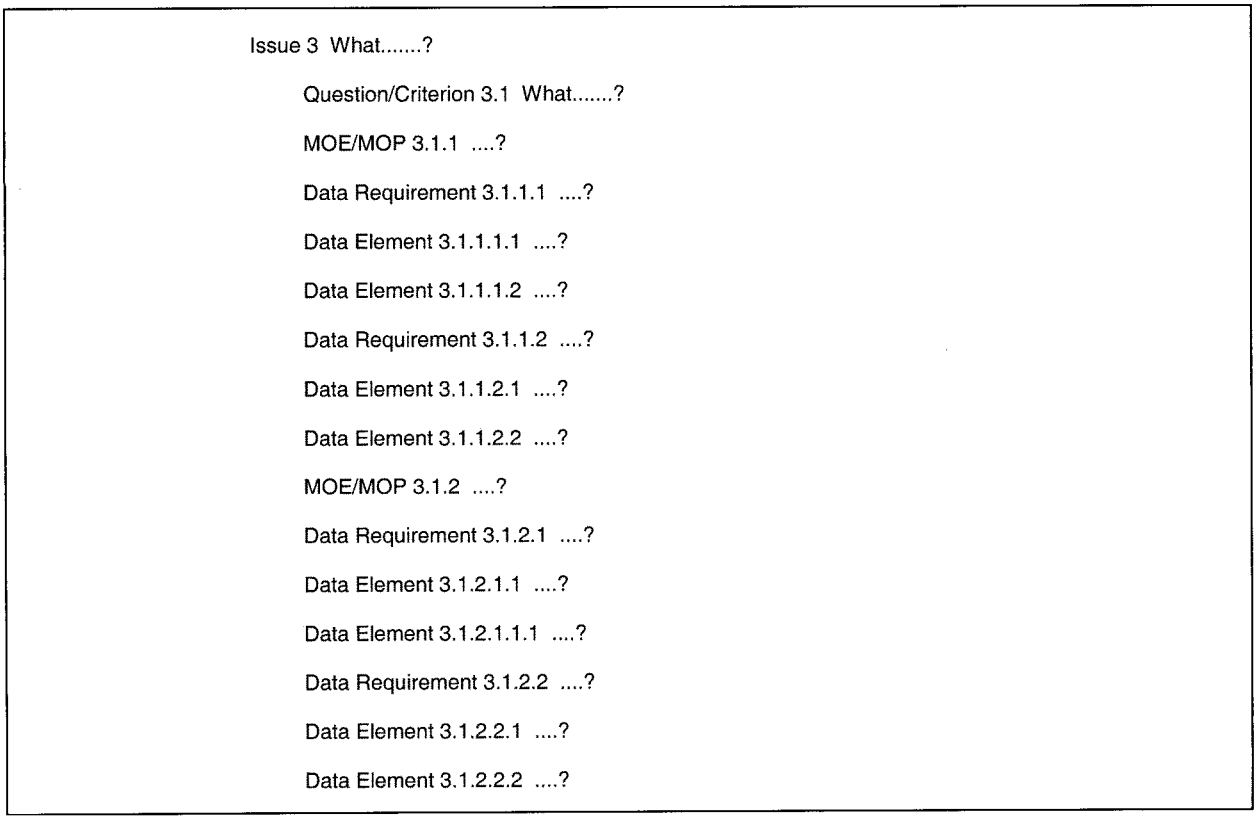


Figure 6–6. Pattern of Analysis example format

(1) *Development.* The initial portion of the PA is developed by the system evaluator as a function of the development of the detailed evaluation requirements following approval of the evaluation strategy at the Early Strategy Review (ESR). Using the approved strategy and the COI and AI, the system evaluator develops the initial portion of the dendritic of the PA to organize requirements under the broad areas of operational effectiveness, suitability, and survivability. Each issue or requirements for the issues are assigned to one of the functions of effectiveness, suitability, and survivability as appropriate. Measures are developed to address requirements to answer each issue (without concern as to the data source). This process may suggest that a draft AI could be better incorporated or other draft AI are required. If so, the draft AI should be eliminated as a separate issue. The measures are used by the system evaluator to support development of the required data sources and the DSM. The event executor finalizes the PA and develops the individual data elements by using the measures assigned to a specific event.

(2) *Priority levels.* As part of the process, the system evaluator, in coordination with operational tester, will establish the priority for each measure using the priority levels as shown below. The measure priority assists the operational tester if test resources are subsequently changed necessitating a change in the test design.

(a) Priority 1. Measures required for answering the critical issues of operational effectiveness, suitability, and survivability. Measures that are directed for inclusion by others who approve/disapprove test plans (that is, DUSA(OR) or DOT&E).

(b) Priority 2. Supportive Measures that mitigate the level of risk in answering COI/AI and that address areas resulting from continuous evaluation lessons, and/or critical mission essential software functions that didn't work well during DT.

(c) Priority 3. Measures that are prudent to collect and support answering the issues (for example, causality or diagnostic).

(d) Priority 4. Measures that are recommended for inclusion by others in the T&E community (for example, AMSAA, PM, or TSM.

(3) *Ultimate goal.* The ultimate goal of the PA is to link COI and AI with simple and measurable data elements. The key to establishing this link, within the process of subdivision, is the identification of each MOE or MOP. MOEs focus on mission accomplishment and military utility. They serve as the higher level measures. MOPs normally can be expressed numerically in observable terms that represent identified dependent variables by which the system performance can be characterized. Data elements are the lowest level of information collected and generally require recording of an item of information that is factual, based upon observation or instrumentation, and require no linkage with any other data element to record. A quality PA is used by the event executor to assist in the planning and development of requirements for the event scenario or other scheduling plan, as well as the data collection and management plan.

h. Operational event date planning requirements are often expressed in relation to the event start date or end date. The OTP and RS milestones are based upon this system. This methodology is used in the event planning and reporting documents. The following test date definitions are provided to preclude any confusion concerning the process:

(1) *Test start date (T-date).* T-date is defined as the date on which data collection for record begins. Pretest training and pilot test activities are accomplished prior to T-date.

(2) *Test end date (E-date).* E-date is defined as the date on which data collection for record is completed. Supporting assets are normally released at or shortly after E-date.

6–44. Entrance criteria for OT

Entrance criteria provide a structured mechanism for identifying and reducing risks associated with transitioning from DT to OT. To assist in developing system specific entrance criteria, table 6–3 provides a set of detailed "templates," that can assist in reducing and eliminating risk. Establishment of system specific OT entrance criteria can help document a credible and effective development program. The contents of these templates are not directive and do not supersede existing acquisition guidance. The requirement for certification of system readiness for OT descends from DODI 5000.2. Detailed information regarding each template is located at appendix X.

Table 6–3
OT Entrance criteria matrix of templates

Test Planning & Documentation	Test Planning & Documentation	System Design & Performance	System Design & Performance	Test Assets & Support	Test Assets & Support
Schedule	Concept of Operations	Contractor Testing	Production Rep Articles	Test Team Training	Packaging, Handling and Transportation
Requirements	TEMP	Developmental Testing	Interoperability & Compatibility	Personnel	Support Agreements/ Contractor Support
AoA	OT Event Design Plan	Live Fire Testing	Software Development	T&E Infrastructure	Threat Systems
STAR	Deficiency ID & Correction Process	System Performance	Safety Reviews & Certifications	M&S	Technical Data
Maintenance Concept	Security Planning	System Maturity	Deficiency Resolution	Support Equipment	CTSF Testing
	Configuration Management Plan			Sufficiency of Spares	Joint Interoperability Testing (if required)

6–45. Operational test readiness review

Operational test readiness reviews (OTRRs) are conducted prior to each OT to allow Commander, ATEC (or other operational test commander) to assess the overall readiness for test of the system. The OTRRs determine readiness of the system, support packages, instrumentation, test planning, and evaluation planning to support the OT. The OTRR includes identification of any problems that impact the start, or adequate execution of, the test and subsequent evaluation or assessment of the system. The objective of the review is to determine if any changes are required in planning, resources, training, equipment, or timing to successfully proceed with the test.

a. OTRR composition.

(1) OTRRs are chaired by Commander, ATEC; the commander of any other operational test activity; or their designees. The Commander, ATEC chairs all OTRRs for ACAT I, ACAT II, MAIS, and OSD T&E oversight systems. He may delegate the chair for a specific OTRR. Commander, OTC (or other operational test commander) will chair

OTRRs for non-major, non-oversight systems and for FDT/E, CEP, and CT. He may delegate the chair for a specific OTRR.

(2) Principal OTRR attendees include the operational tester, system evaluator, PEO/PM/MATDEV, CBTDEV, TNGDEV, logistician, developmental tester, command providing user troops for test (normally FORSCOM), HQDA staff elements, host installation, and contractors.

(3) The operational tester (Test Director or Test Officer) will provide planning, administrative support, and reporting results for the OTRR. For ACAT I, II, and all systems on the OSD T&E Oversight List, the tester works in close coordination with the system evaluator to schedule the OTRR and establish the agenda.

b. OTRR schedule. Three OTRRs are essential for most post-Milestone B operational tests. When necessary, any of the participants may request the chair convene an additional OTRR. An OTRR may not be used for purposes outside its intended scope such as system reviews. Table 6–4 depicts recommended dates for the OTRRs. The three essential OTRRs follow:

Table 6–4
Recommended OTRR dates

OTRR[1]	Date [2] (days)	Remarks
#1	T–270	Action Officer Review to identify any restraints to test planning and coordinate corrective actions
#2	T–60	Review adequacy of test readiness prior to approval of deployment of resources to OT site
#3	T–1	Review results of pilot test, to include end-to-end data run, and approve start (or delay) of the OT

Notes:
[1] Additional OTRRs may be conducted.
[2] T is the OT Start Date

(1) An action officer level review (which is chaired by the operational tester) at approximately 9 months prior to test (T–270). This review focuses on identifying those activities and actions, if any, that appear to be moving too slowly to support the test start date or proper test execution. At this meeting, any misunderstandings on the identity of activities responsible for elements of test planning, readiness, and execution are resolved. For selected high-interest tests, this OTRR may be elevated to a general officer level OTRR.

(2) A review prior to resource (player, testers, and equipment) deployment to test site (normally at T–60). A primary consideration of this review is to ascertain if any known problems exist that would delay test start, and to preclude incurring deployment costs when the test start date is in jeopardy. At this review, resource providers confirm their readiness to release the resources to the tester. MATDEV, CBTDEV, TNGDEV, and test unit OTRS are provided to the tester at this review. The Safety Release should be provided at this OTRR, but if not, it must be provided prior to beginning of hands on training of test players. For all templates, a color-coded summary status should be provided. For incomplete, open template line items (that is, red or amber) the PM must provide a separate briefing slide indicating status and/or corrective action plan.

(3) A review prior to the beginning of record test in order to determine if the tested system, players, testers, ITTS, and data reduction procedures are ready for testing for record. This OTRR is normally conducted at the test site during latter phases of, or immediately following, the pilot test. In addition to topics addressed during previous reviews, data collection and data reduction techniques, functions of automatic data processing systems, validity of pilot test data, and operations of the DAG, if appropriate, are examined. The test officer and the system evaluator confirm the success of end-to-end data runs.

c. Pre-OTRR. A pre-OTRR is normally conducted the day prior to the official OTRR. The pre-OTRR is an action officer level meeting that attempts to reduce known problems by developing solutions and milestones prior to the OTRR. Normally, only matters that could prevent valid testing (potential "show stoppers") are briefed at the OTRR. In those cases where the T–270 OTRR is conducted at the action officer level, there is no need for a pre-OTRR.

d. OTRR product. The resultant product of each OTRR is a decision by the chairman to execute the OT as planned, to direct required changes to ensure successful test execution, or to recommend (to the program decision authority) delay or cancellation of OT. Start of the OT will be delayed when a problem is identified that would affect the validity of the data being collected to address the evaluation issues. OT start can also be delayed when it is apparent that the system has little chance of successfully attaining critical technical parameters or satisfying critical operational criteria, and deficiencies cannot be resolved before the start of the test. OT may also be delayed when it becomes evident that critical test data or information cannot be obtained to adequately answer the issues. (See AR 73–1.)

e. OTRR preparation. OTRR preparation includes the following:

(1) The OT activity will be responsible for scheduling the OTRR. Attendees will be notified of a scheduled OTRR and the planned agenda at least 30 days prior to the review.

(2) A typical OTRR agenda is provided at figure 6–7. It should be used as a guide in developing an appropriate agenda for a particular system. Mandatory subjects for briefing by the tester at all OTRRs are specifically identified. The agenda should always include provisions for the MATDEV, CBTDEV, TNGDEV, and test unit commander to provide their OTRS, which formally addresses system readiness for OT. Additionally, prior to OT to support the FRP DR, the PM certifies the system is ready for a dedicated phase of OT. The status of any incomplete OT Entrance Criteria Template.

f. Minutes. Minutes of an OTRR are distributed to OTRR participants within 10 working days after adjournment of the OTRR. Within 3 working days after adjournment of the OTRR, external commands or agencies are notified by either message or memorandum of any issues or problems surfaced during the OTRR for which their agency has responsibility for resolving prior to test start. The message may solicit the personal assistance of the agency commander in overseeing necessary corrective actions. Within 5 working days after adjournment of the OTRR, a status report outlining the results of the OTRR is provided to the appropriate decision-makers. The format and addressees are determined on a case-by-case basis by the chairman, based on the outcome of the review and degree of assistance required to resolve outstanding issues.

6–46. Operational Test Readiness Statement (OTRS) requirements

a. As a prerequisite for test initiation and prior to the start of the test, the MATDEV, CBTDEV, TNGDEV, and test player unit commander each provide the operational tester with a written statement of the system's readiness for OT. The operational tester specifies in the OTP milestone schedule the suspense dates for the Operational Test Readiness Statement (OTRS) (normally 60 days prior to the test start date).

b. Deviations from the required readiness standards for test (such as, system safety and training) require a statement of explanation by the OTRS proponent (such as, MATDEV, CBTDEV, and/or TNGDEV).

c. For ACAT I and II system OTs conducted in support of the FRP DR, the MATDEV OTRS must certify that the system is ready for a dedicated phase of OT&E. (See DODI 5000.2.)

d. The system evaluator and operational tester review the OTRS to ensure that identified deficiencies will not affect the ability of the OT to answer the evaluation issues.

e. For OTs not conducted by ATEC, information copies of the OTRS are provided to ATEC. An OT will not be initiated until all OTRSs have been received and reviewed by ATEC.

f. Types of OTRSs include—

(1) *MATDEV OTRS.*

(a) The MATDEV describes the system to be tested in terms of size, shape, weight, transportability, and functional characteristics.

(b) For software-intensive systems, the MATDEV specifies the software version to be tested and current documentation to be made available. A detailed statement of how both the system hardware and software characteristics differ from a fully representative IOC system is provided, where appropriate.

(c) The MATDEV identifies the DT objectives that have been met and all failures and deficiencies that have been corrected. Any DT objectives not met or failures not corrected will be detailed, and estimates of their effect on OT described.

(d) The MATDEV identifies special instrumentation required and the availability of that instrumentation through his or her office.

(e) The MATDEV identifies the system maintenance, training, and supply resources requirements that are to be evaluated during test. Military resupply procedures, support procedures, and special support requirements are defined. If system contractor support is called for, the specific role of the system contractor is defined at each echelon.

(f) The MATDEV estimates the current and projected RAM performance in terms of the system ORD.

(g) The MATDEV includes a detailed statement concerning any restrictions to ordinary operations under field conditions that will exist in the test.

(h) The MATDEV provides a Safety Release for the system (obtained from ATEC's DTC) or identifies the status of the release.

(i) The MATDEV includes a mission impact analysis of unmet criteria, including critical interoperability problems to be assessed during the OT.

(j) The MATDEV certifies and accredits communications system per DODI 5200.40.

(k) The MATDEV includes the results of the Environment, Safety, and Occupational Health review.

Operational Test Readiness Review Agenda

1. **Purpose**

2. **Program Sponsor Issues** (Program Sponsor)
   a. Results of Previous Testing.
   b. System Equipment Status.
   c. Operational Test Readiness Statement.
   d. Safety Release.
   e. System Delivery Schedules (Milestone).
   f. Contractors Support.
   g. Logistics Support Plan.
   h. Instrumentation.
   i. System Transfer Plan.
   j. Certification of Systems Readiness for OT.
   k. Certification that software design is stable.
   l. Other Special Topics, such as information assurance.

3. **Combat Developer/Trainer Issues** (Combat Developer/Trainer)
   a. Test Soldier Training Results.
   b. Operational Test Readiness Statement.
   c. Safety Release.
   d. Logistic Concept.
   e. Operational Mode Summary/Mission Profile.
   f. Threat.
   g. Test Setting.
   h. Certification for System Readiness for OT.
   i. Other Special Topics.

4. **Test Readiness** (Operational Tester)
   a. Test Directorate Organization (Mandatory). Description of the overall test organization and structure for the test.
   b. OTP Resources/FORSCOM Support (Mandatory). Status of support required/received or coordinated in accordance with OTP.
   c. System Evaluation Plan/Event Design Plan/Detailed Test Plan (Mandatory). Overview of the test design to include issues and criteria as appropriate and status of SEP development.
   d. Test Schedule (Mandatory).
   e. Participation/Other Agencies.
   f. Pilot Test (Plan or Result) (Mandatory). Description of planning pilot test activities or results of the pilot test.
   g. Data Displays.
   h. Data Collection Reduction and Processing Plan.
   i. Test Instrumentation Status.
   j. Threat representation.
   k. Test Site Support Plan.
   l. Human factors.
   m. Status of MOUs.
   n. Other Special Topics, such as information assurance.

5. **Overall Readiness** (System Evaluator)
   a. Evaluator Critique of System Readiness.
   b. Evaluator Critique of Tactics, Techniques, and Doctrine.
   c. Evaluator Critique of Threat.
   d. Evaluator Critique of Training Readiness.
   e. Evaluator Critique of Test Readiness.

Figure 6–7 (PAGE 1). Sample Operational Test Readiness Review agenda

f. SEP Status.
g. Overall Evaluation.

6. **DAG Composition and Operation** (Operational Tester)

7. **ADP Plan** (Operational Tester)

8. **Funding** (Operational Tester)

9. **Identification and Review of Showstoppers or Potential Showstoppers** (Operational Tester and Evaluator)

10. **Review of Action Items** (Operational Tester)

11. **Discussion** (All)

12. **Decision** (Chairman)

Figure 6–7 (PAGE 2). Sample Operational Test Readiness Review agenda—Continued

(2) *CBTDEV OTRS.* The CBTDEV OTRS verifies that the doctrine, organization, threat, logistics concept, crew drill, and standard operating procedures (SOPs) in the CBTDEV's support packages are complete, represent planned employment, and are approved for use during OT.

(3) *TNGDEV OTRS.* The TNGDEV OTRS verifies that the training concepts and materiel and crew drills included in the training support package are complete, representative of the training package to be used at fielding, and approved by TRADOC for use during OT. In addition, it verifies that the user troops have satisfactorily completed training in accordance with the training support package and are ready for test.

(4) *Test Unit OTRS.* A signed OTRS is required from the test unit commander. This statement certifies that unit personnel are Military Occupational Specialty qualified and where appropriate, the test unit can perform the required External Evaluation tasks. This statement does not certify that unit personnel are trained on the test item.

6–47. Safety Release for operational testing

a. A written system Safety Release obtained from ATEC's DTC must be on hand prior to initiating any training or testing involving user troops. The test officer must ensure TRADOC proponent schools and all test directorate and test player personnel know safety precautions and procedures. At OTRR #2 (T–60), the program sponsor or other agency responsible for the Safety Release will provide it to the test officer.

b. ATEC's DTC is responsible for issuing the Safety Release (see AR 385–16) for all materiel systems being tested, including type classified materiel if the materiel is to be used in a new or innovative manner. Exceptions to this policy are systems being developed by MEDCOM. The program sponsor must submit requests for the Safety Release to ATEC's DTC as soon as the requirement is known, along with all data available regarding the item. When sufficient data are not available on which to base a Safety Release, it may be necessary to conduct additional testing. If required, the developer will pay test costs and the time required for issuing a Safety Release will increase accordingly. Funding for any required testing will be included in the OTP. To assure timely receipt of the Safety Release, the operational tester must proactively coordinate with the activity responsible as soon as the requirement is known.

c. A copy of the Safety Release is provided to the commander of the organization supplying the troops to ensure that the organization is informed of the identified risks. For weapon systems, both live fire and non-fire Safety Releases may be required.

d. Where appropriate, the Safety Release indicates the results of TSG's Center for Health Promotion and Preventive Medicine (CHPPM) investigation of medical or health problems related to the materiel system and include a certification as to the safety of user troops. Operational tests using aircraft require an airworthiness release. (See AR 70–62.)

6–48. Delay or termination of operational testing

a. In the event that an OTRR indicates that testing should be delayed (for example, inadequacies of SSPs, OTRSs, training, test planning, instrumentation, and so forth that will adversely affect test start, execution, or its realism and/or completeness), alternative courses of action and recommendations are developed that, if executed, assist in maintaining the integrity of the test.

b. Due to the TSARC one-year notification requirements for provision of resources for support of OT, a seemingly short delay in the start of the OT could result in a delay of a year or more. (See AR 73–1.)

c. If a determination is made that suspension of testing is necessary, the chairman expeditiously forwards the issues and recommendations to the decision authority, with information copies to the MDR principals, for a decision to start, delay, or terminate the test.

6–49. Operational test pretest activities

These activities involve all pretest training, organizing for execution and support, preparation of equipment and test areas, the pilot test, adjustment of plans (if necessary), and all other actions required to prepare for the test. The training plan and support plan are of major interest during these activities.

a. Training phase.

(1) Regardless of the type of test, some evaluation of training and training support is normally conducted. This is necessary to ensure the skills and knowledge necessary to operate and maintain the system can be attained and sustained within realistic training environments by units using personnel of the type and qualification expected when the system is deployed. When training is an issue, MANPRINT and training data collection must begin prior to T-date (in other words, at the start of player training).

(2) Conducting NET is the MATDEV's responsibility. NET transfers knowledge gained during materiel development to trainers, users, and support personnel during development and fielding of new equipment. The contents of the NET TSP are described in paragraph 6–60.

(3) TRADOC provides for the analysis, design, development, implementation, and control of resident training programs and exportable training products. The TRADOC school responsible for the Military Occupational Specialty affected by the test item will prepare a Training TSP.

(4) The extent of training and training support evaluations is contingent on the test type and stage of development of the system being tested. Ordinarily, training is contractor administered in the early phases of materiel development. For subsequent phases, the MATDEV provides training to military instructor personnel, who then train test participants. The objective, however, remains the same: to assess the adequacy of training associated with fielding the system.

(5) Test officers ensure that test directorate and player personnel are adequately trained. This often requires coordination with support divisions and TRADOC proponent schools. It is also important to ensure that test player personnel satisfy test requirements in terms of Military Occupational Specialty and skill level. Training includes that necessary for controllers, support personnel, data collectors, and data reducers.

(6) Training conducted in support of tests will include training individuals, crews, and units in individual and collective tasks required to employ the system in accordance with approved doctrine and tactics. Training will be in accordance with the TSP and representative of that intended to support the system when initially fielded. The proponent TRADOC school must provide the test organization and Headquarters, OTC with certification stating test players have been trained and can perform individual and collective tasks to standard in accordance with the milestone schedule in the OTP. This written statement constitutes one element of the OTRS but is provided separately from other elements of the training developer's OTRS.

(7) All training provided to player personnel, any performance problems during the test attributable to inadequate training, and comments of personnel who received the training must be recorded and subsequently analyzed.

(8) Data are collected during the training phase if required by the SEP. If the SEP does not require training phase data, the test officer may wish to collect these data as a training device for data management personnel and as an opportunity to perform an end-to-end data run.

b. Support. Adequate support is essential to any test execution. The test officer must ensure that all logistical and administrative requirements that are planned or becomes necessary for the test execution are properly performed. The requirements and plans for support are documented in the OTP for the test.

c. Operational test pilot test phase.

(1) A pilot test is an abbreviated version of the actual test and is conducted in advance to detect deficiencies in the plan, instrumentation, data collection, data management, and test control. It includes the exercise of each type of required event and makes use of each data collection means. It is essential that the complete data management procedure, to include DAG operational procedures IAW the DAG SOP, be verified as a part of the pilot test.

(2) The pilot test is addressed in the EDP with sufficient time between pilot test and the start date of the actual test so as to allow for identification of, reaction to, and correction of any deficiencies encountered. Tests relying heavily on instrumentation may require additional time after the pilot test for the correction of problems. Accomplishment of an abbreviated program of events is usually sufficient, although an abbreviated control procedure may also be required.

(3) If a pilot test is not required, it is to be explicitly stated in the SEP. When extensive training of player personnel is required, a pilot test may be conducted concurrently with the training test phase.

(4) Problems revealed during the pilot test are to be corrected prior to the actual test. This may involve the conduct of additional training, identification of additional support, resources, changes to the EDP, or revision to the SEP.

(5) The length of the pilot test must permit the exercise of every type of major event required in the test, as well as every type of data collection instrument to be used. There should be enough workdays between the end of the pilot test and actual T-date to incorporate any necessary changes.

(6) Test directorate organizations must duplicate those conditions envisioned for the actual test and all directorate members must participate. The degree of player participation must be tempered by considering if learning during the pilot test would bias results of the actual test.

(7) Data should be collected and reduced in the same manner by the same personnel to be used during the actual test. A complete end-to-end data run must be conducted. This starts with test events and goes through every step until the created test database is accessed.

(8) All manual data collection forms must be validated and all instrumentation, from stopwatches to computers, used. The need for filming test events should be carefully reviewed. Video tape is an excellent way to record data; however, the data reduction and analysis effort associated with this medium can be lengthy and tedious.

(9) If the test involves a two-shift operation, data review procedures must be established and validated during the pilot test.

(a) One of the best methods of injecting quality control into the data collection effort is for the data manager or assistant data manager to be present at the shift change to review collected information. Temporary data collection forms may be created for each specific test conducted, based upon the specific requirements of the test and the characteristics and requirements of the system under test (SUT). The completed forms need to provide complete data, legible narrative comments, and be dated and signed.

(b) Incomplete forms indicate the data collector does not understand the job or is not interested in doing the job right. In either case, the problem must be resolved prior to the test commencement.

(c) The conduct of data reviews and debriefings at shift changes is essential.

(10) Upon completion of the pilot test, all test directorate personnel should be critiqued on their performance and encouraged to ask questions and discuss problems they encountered. It is essential for all test directorate personnel to understand their responsibilities and to know whom to contact should a problem occur.

(11) Adjustments may be required to correct deficiencies revealed. This may involve conducting additional training, requesting additional support, revising control procedures, altering the test directorate organization, and revising data collection forms.

(12) All problems surfaced during the pilot test must be addressed. They will not go away during actual testing. All issues will be discussed and resolved at OTRR #3. This review will give the go-ahead to start the test.

(13) Contingent upon the desires of the system evaluator, data collected during training and the pilot test may, or may not, be considered valid. This is particularly true for RAM data. Use of these data should be in accordance with the approved SEP and associated FD/SC. These data must be comparable and compatible with the data from record trials. If any of the data from the pilot test are used as data in the test report, the data must be obtained under the same test conditions as the record trials.

6–50. Data Authentication Group (DAG) operations

The DAG authenticates and validates the test data, ensuring that test data accurately reflect the system performance during the test and provide the single test database of record (the ground truth) for all users of the test data. The DAG identifies and analyzes anomalies in the system under test, instrumentation, and test data. The DAG provides interested agencies a conduit to express opinions during test planning and execution.

a. Establishment of the DAG. The system evaluator establishes the requirements for a DAG on full-evaluation system tests. These requirements are documented in the SEP. If the system evaluator does not require a DAG, the tester determines if a need exists and establishes a DAG accordingly. The tester also determines if a need exists and establishes a DAG for an abbreviated evaluation system and for FDT/E, CEP, and CT.

b. DAG. DAG roles and missions include—

(1) The DAG brings together the interested parties on an operational test and allows these parties to view test planning, execution, and data reduction. DAG members provide recommendations to the system evaluator and tester on matters of test design, test conduct, and test data reduction. It provides a level of quality assurance above that expected from the data management/quality control function. The DAG acts as advisory group to the test director and the system evaluator.

(2) Due to the variations in development systems, evaluation strategies, test designs, and data collection efforts, the duties of each DAG are specifically tailored to accommodate the unique requirements of the test. The system evaluator and the tester carefully define the relationship between the DAG and the other elements of the test directorate.

(3) The DAG acts independently of the data management and quality control process and does not work under the supervision of the data manager.

(4) DAG members will review and authenticate the test conduct, data collection, data reduction, and database contents as indicated by the DAG SOP. The DAG will identify and investigate any problems, discrepancies, or anomalies found in these areas, and make recommendations to the test director for resolution of these problems. The DAG verifies that the data contained in performance, human factors, and RAM test databases are valid test results. The DAG will publish reports as required. The DAG serves to promote T&E and acquisition communities understanding and acceptance of the operational test data.

(5) Final decisions on test design, test conduct, and test data reduction lie solely with the tester and system evaluator.

(6) The following values provide a moral compass for the DAG:

— Warfighter Comes First. Acknowledges that the user relies on the DAG to ensure that the event data reported reflects the demonstrated capabilities of the system.
— Truth. DAG remains objective while using all available and appropriate sources of information tempered with credible military and engineering judgment.
— Total System. DAG examines all aspects of the total system to include the human and environmental elements.
— Value Added. While being in a unique position to identify deficiencies and shortfalls, DAG will ensure timely feedback to the CBTDEV or MATDEV/PM so as to identify proper fixes.
— Responsiveness. Within reason, DAG should strive to accommodate a program's schedule or unique considerations.
— Cost Effectiveness. To the extent possible, DAG should economize wherever possible while producing a credible product.
— Independence. DAG will let nothing interfere or jeopardize their integrity in accomplishing their mission.
— Minimal Intrusion. Within the demands for obtaining valid findings, DAG will minimize obtrusion to the test conduct.

c. DAG membership. Membership includes——

(1) The tester normally chairs the DAG.

(2) The DAG Charter establishes DAG membership. Mandatory members are the system evaluator and tester. Other members are selected from the CBTDEV, MATDEV, Developmental Tester, and other members of the acquisition team. Membership is extended to any pertinent Government agency (for example, DOTE, AAA, GAO) with a vested interest in the system under test. The members of the DAG represent a broad spectrum of technical disciplines and system expertise.

(3) Each DAG is organized to accommodate the unique requirements of the test. Large DAGs are typically organized into various functional teams such as a performance validation team, a MANPRINT data validation team, a RAM data validation team, and a research cell. Small DAGs may consist of one cell.

(4) Section 2399 of Title 10 of the USC prohibits system contractors from direct participation in the DAG for MDAP programs. The DAG permits no system contractor manipulation or influence during IOT and other activities that provide input for consideration during and beyond LRIP decisions for ACAT I and II systems. While system contractor personnel will not attend or be directly involved as members or observers in any DAG sessions, they can be relied upon as technical SMEs.

(5) Support contractors to DAG members may participate in the DAG if they have never had a contractual relationship to the system contractor on the system under test.

d. Resources. All resources for the functions of the DAG must be included in the OTP for the test. The tester must estimate resources for personnel, travel, equipment, facilities, and overtime, with input from the system evaluator.

e. Training. The DAG cannot function properly if the members do not have adequate training. Training should be addressed in the DAG SOP and, as a minimum, members should have training in operations and capabilities of the system under test, familiarization with test purpose and concept as documented in the SEP and EDP, the data reduction plan and instrumentation for the test, the DAG SOP, and test organization and key personnel.

f. Data levels. Data levels include—

(1) The originator of the requirement for the DAG determines the data levels to be reviewed by the DAG and addresses this in the DAG SOP. Each member of the DAG should be clear on the meanings of each data level as given in table 6–5.

(2) The DAG SOP may call for examination of data from levels 1–3 in the authentication process. Once the level 3 database has been reviewed and approved by the DAG, it becomes the authenticated database, which is the database of record for that test. Timely release of authenticated level 3 data to members of the acquisition team is highly encouraged. Release of less than authenticated level 3 data will be handled on a case-by-case basis.

(3) The analysts can reduce and analyze these data into findings and assessments (levels 4, 5, 6, and 7).

Table 6–5
Levels of data

Level	Description	Possible forms	Example of content	Disposition
Level 1 "Raw Data"	Data in their original form. Results of field trials just as recorded.	Complete data collection sheets, exposed camera film, voice recording tapes, original instrumentation magnetic tape or printouts, original videotapes, completed questionnaires, and/or interview notes.	1. All reported target presentations and detection. 2. Clock times of all events. 3. Azimuth and vertical angle from each flash base for each flash. 4. Recording tapes of interviews.	Accumulated during trials for processing. Usually discarded after use. Not published.
Level 2 "Reduced Data"	Data taken from the raw form and consolidated. Invalid or unnecessary data points deleted. Trials declared "No Test" deleted.	Confirmed and corrected data collection sheets, film with extraneous footage deleted, corrected tapes or printouts, and original raw data with "No Test" events marked out.	1. Record of all valid detections. 2. Start and stop times of all applicable events. 3. Computed impact points of each round flashed. 4. Confirmed interview records.	Produced during processing. Usually discarded after use. Not published.
Level 3 "Ordered Data"	Data that have been checked for accuracy and arranged in convenient order for handling. Operations limited to counting and elementary arithmetic.	Spread sheet, tables, typed lists, ordered and labeled printouts, purified and ordered tape, edited film, and/or edited magnetic tapes.	1. Counts of detections arranged in sets showing conditions under which detections occurred. 2. Elapsed times by type of event. 3. Impact points of rounds by condition under which fired. 4. Interview comments categorized by type.	Not usually published but made available to analysts. Usually stored in institutional databanks. All or part may be published as supplements to the test report.
Level 4 "Findings" or "Summary Statistics"	Data that have been summarized by elementary mathematical operations. Operations limited to descriptive summaries without judgments or inferences. Does not go beyond what was observed in the test.	Tables or graphs showing totals, means, medians, modes, maximums, minimums, quartiles, deciles, percentiles, curves, or standard deviations. Qualitative data in form of lists, histograms, counts by type, or summary statements.	1. Percentage of presentations detected. 2. Mean elapsed times. 3. Calculated probable errors about the centers of impact. 4. Bar graph showing relative frequency of each category of comment.	Published as the basic factual findings of the test.
Level 5 "Analysis" or "Inferential Statistics"	Data resulting from statistical tests of hypothesis or interval estimation. Execution of planned analysis data. Includes both comparisons and statistical significance levels. Judgments limited to analysts' selection of techniques and significant levels.	Results of primary statistical techniques such as T-tests, Chi-square, F-test, analysis of variance, regression analysis, contingency table analyses and other associated confidence levels. Follow-on tests of hypotheses arising from results of earlier analysis, or fallback to alternate nonparametric technique when distribution of data does not support assumption of normality. Qualitative data in the form of prevailing consensus.	1. Inferred probability of detection with its confidence interval. 2. Significance of difference between two mean elapsed times. 3. Significance of difference between observed probable error and criterion threshold. 4. Magnitude of difference between categories of comments.	Published in system evaluation reports. (If system evaluation report is part of test report, the level 5 analysis results are presented separately from the level 4 findings.)
Level 6 "Extended analysis" or operations	Data resulting from further analytic treatment going beyond primary statistical analysis, combination of analytic results from different sources, or exercise of simulation or models. Judgments limited to analysts' choices only.	Insertion of test data into a computational model or a combat simulation, aggregation of data from different sources observing required disciplines, curve fitting and other analytic generalization, or other operations research techniques such as application of queuing theory, inventory theory, cost analysis, or decision analysis techniques.	1. Computation of probability of hit based on target detection data from test combined with separate data or probability of hit given a detection. 2. Exercise of attrition model using empirical test times distribution. 3. Determination of whether a trend can be identified from correlation of flash base accuracy data under stated conditions from different sources. 4. Delphi technique treatment of consensus of interview comments.	Published as appropriate in system evaluation reports.

Table 6–5
Levels of data—Continued

Level	Description	Possible forms	Example of content	Disposition
Level 7 "Conclusion" or Evaluation	Data conclusions resulting from applying evaluative military judgments to analytic results.	Stated conclusions as to issues, position statements, and challenges to validity or analysis.	1. Conclusion as to whether probability of detection is adequate. 2. Conclusion as to timeliness of system performance. 3. Conclusion as to military value of flash base accuracy. 4. Conclusion as to main problems identified by interviewees.	Published as the basic evaluative conclusions of system evaluation reports.

6–51. System contractor relations

a. The intent of 10 USC 2399 is to ensure that, during IOT, major defense acquisition systems are operated, maintained, and otherwise supported by personnel typical of those who will carry out such functions when the system is deployed in combat. (See AR 73–1.)

b. To ensure there is no system contractor manipulation and/or influence during IOT or related activities which provide input for consideration in the system evaluation leading to a FRP DR, system contractor personnel will not—

(1) Participate, except to the extent they are involved in the operation, maintenance, and other support of the system when it is deployed in combat or other normal use (for example, training or instrumentation).

(2) Establish criteria for data collection, performance assessment, or evaluation activities for OT data.

(3) Participate in collecting, reducing, processing, authenticating, scoring, assessing, analyzing, or evaluating OT test data.

(4) Attend or be directly involved as members or observers in DAG sessions (see para 6–52) or in RAM scoring or assessment conferences that address data supporting evaluation or assessment of their systems.

c. Discussions with system contractor personnel may be necessary to ensure full technical understanding of test incidents observed during the IOT&E or related activities. All discussions will be held separately from any scoring or assessment activities. The MATDEV should maintain written record of the nature of these contractor and Government discussions.

d. Since some systems will be maintained by contractors after fielding, it is imperative that any contractor effort be defined in writing prior to T-date. Ideally, any authorized contractor maintenance would be specified by level and extent in each of the appropriate test support packages. Contractor efforts should be an agenda item briefed at the T–60 OTRR, and agreed to by all parties. EUT and FDT/E prior to IOTE will often require a greater amount of contractor maintenance support, but this must be worked out in the T&E WIPT.

6–52. Release of operational test information

a. Release of OT data to members of the acquisition team (AT) (that is, MATDEV, CBTDEV, and TNGDEV) is authorized as soon as the Level 3 data are authenticated. Release is also authorized to TEMA, DUSA(OR), DOT&E, and OUSD(AT&L)S&TS, DT&E. The operational tester is authorized to release these data. The release of emerging test results should be provided to the MATDEV as early as possible so that maintenance releases can be accomplished using available data before official release of the report. (See DODI 5000.2.)

b. Release of OT data beyond the AT will be accomplished only with the approval of CG, ATEC or the commander of other OT&E activities. All such requests for data must be coordinated with the tester, system evaluator, and PEO/PM.

c. The conduct of operational tests on new materiel has gained widespread interest, resulting in numerous requests for interim OT data. These requests are generated by congressional survey and investigative committees, GAO, AAA, industry, contractors, and private individuals.

d. Any requests for test information received by the test team from members of news media or civic organizations should be reported immediately to the appropriate agency public affairs officer. Requests for information from private industry or individuals will be processed as public information releases or Freedom of Information Act (FOIA) requests. Directives addressing the release of information must be used for guidance. (See AR 1–20.)

e. Release of draft or interim test reports, system evaluations, or system assessments is to be handled on a case-by-case basis, given the level of interest and direction by HQDA, OSD, and the Congress. Assessments made prior to the complete analysis of test results can be very misleading. Such assessments can be found to be incorrect when the complete set of test data is thoroughly analyzed. Moreover, an assessment based upon an incomplete set of test data can cause biases that are difficult to overcome, even when further information proves the initial analysis to be correct.

f. Release of interim data or reports outside of the AT will require—

(1) Requesting agency providing written or verbal request for data to Commander, ATEC or other designated OT&E agency. Expeditious requests may be made via facsimile or phone.

(2) Verification of the requester's identity and need.

(3) Assessment of any difficulties associated with providing the information requested.

(4) Coordination with OT&E agency staff may be accomplished in the most efficient manner possible, such as telephonically, e-mail, or facsimile.

(5) Provision of funding necessary for duplication of large or complex database information.

(6) A transmittal letter stating limitations and caveats and an explanation that this is interim data and should not be used to develop conclusions.

g. All data released will be as authenticated (that is, validated) and complete as possible. The data or report will be clearly marked as interim and cautions to be considered in using it will also be stated.

h. Copies of the release letter will be retained in the official system file.

i. Release of information to system contractors will be made only through the PEO, PM, or appropriate MATDEV representative. Release of information to support contractors will be made only through the COR or COTR.

j. Security classification and procedures to protect classified or competition-sensitive information will always be observed.

k. Timely reporting of test results is essential and is accomplished through Test Incident Reports (TIRs) as well as the formal test reporting procedures. Test incident data are prepared by the operational test organization to provide the results of any incident occurring during testing. In response, as a minimum, the MATDEV prepares corrective action data for all critical or major TIRs. Corrective action data reflect the developer's analysis of the problem and the status or description of the corrective action. All data are put into the ATIRS to enhance the continuous evaluation of the program. (See app V.)

6–53. Operational test report

A test report (TR) is the end product of every test. For those tests in support of the acquisition system, the TR supports the SER, or SA, and provides results of the OT to decision-makers, to other interested members of the AT, and to archives, such as DTIC, for future researchers. For those tests not in direct support of an acquisition system, the TR stands alone as the report of the test effort and provides detailed results to the test sponsor, to other interested activities, and to archives. The test commander or designee prepares the TR. An authenticated level database is provided to the system evaluator and, when requested, to other acquisition team members prior to the approval of the TR to support analytical requirements.

6–54. Test Data Report

The Test Data Report (TDR) is an alternative type of report of test results. It is supported by distribution of an authenticated level 3 database prior to its approval.

Section IV
Test Support Packages (TSPs)

6–55. Test support packages overview

Test support packages (TSPs) are provided to support conduct of Army testing for new systems undergoing development and fielding. TSPs are primarily used during DT and OT prior to the FRP DR. TSPs include the System Support Package, NET TSP, Doctrinal and Organizational TSP, Training TSP, and Threat TSP.

a. System support package. The system support package (SSP) is a set of support elements (that is, support equipment, manuals, expendables, spares and repair parts, and TMDE) planned for a system in the operational (deployed) environment, provided before DT and OT and tested and evaluated during DT and OT to determine the adequacy of the planned support capability. The SSP is provided by the PEO (or PM or MATDEV). An SSP is required for all systems (that is, materiel and C4I/IT). (See AR 700–127.)

b. New Equipment Training Test Support Package (NET TSP). A NET program is first prepared by the PEO/PM/MATDEV with input from the TNGDEV in accordance with AR 350–1 to support training development for new materiel and C4I/IT systems, including conduct of test of new equipment and software. Based on the NET program, the PEO/PM/MATDEV prepares, as appropriate, a NET TSP. The NET TSP is provided to the training developers and testers. It is used to train player personnel for DT and to conduct training of instructor and key personnel who train player personnel for OT. The training developer uses the NET TSP to develop the Training TSP.

c. Doctrinal and Organizational Test Support Package (D&O TSP). The D&O TSP is a set of documentation prepared or revised by the CBTDEV for each OT supporting a milestone decision. Paragraphs or elements in the D&O TSP not needed (as determined by CBTDEV) will be annotated as "not required" in the D&O TSP. Major components of the D&O TSP are means of employment, organization, logistics concepts, OMS/MP, and test setting.

d. Threat Test Support Package (Threat TSP). The Threat TSP is a document or set of documents that provides a description of the threat that the new system will be tested against. A Threat TSP is required for all materiel systems. (See AR 381–11.)

e. Training Test Support Package (Training TSP). The Training TSP consists of materials used by the training developer to train test players and by the system evaluator in evaluating training on a new system. This includes

training of doctrine and tactics for the system and maintenance on the system. It focuses on the performance of specific individual and collective tasks during OT of a new system. The proponent trainer prepares the Training TSP.

6–56. Test support package applicability

TSPs are required to support testing of all systems (including NDI and modification programs) when they are scheduled for delivery by the responsible organizations in the approved OTP (see AR 73–1) for the test. The TSARC is the appropriate forum to resolve issues regarding applicability of any TSP deemed necessary by the tester when preparing the OTP.

a. The SSP is required to support DT and OT for all materiel systems and tactical C4I/IT systems unless waived. (See AR 700–127.)

b. The PM/PEO/MATDEV of the system conducts NET in support of the developmental and operational testers, and trainers of operational test players, for all systems. NET applies to operations and maintenance of equipment, including software updates and associated documentation. The NET TSP provides this information transfer to the trainer.

c. A Threat SSP is required in support of developmental and operational testing for all materiel systems when the T&E WIPT determines that an operationally realistic threat is needed for the test. (See AR 381–11.)

d. While the D&O TSP, NET TSP, and Training TSP are normally critical to the conduct of testing, they are not mandatory and may not be desired when conditions exist that do not require them.

6–57. System Support Package

The System Support Package (SSP) is a composite of support equipment and documentation that will be evaluated during LD and tested and certified during developmental and operational tests including repair parts, tools, maintenance and training manuals, and consumable supplies. For non-tactical C4/IT and space systems, an SSP is prepared for hardware and software. The SSP is to be differentiated from other logistic support resources and services required for initiating the test and maintaining test continuity (for example, the OTP).

a. Content, policy, responsibilities, and other provisions. See AR 700–127 for content of SSPs, and for associated policy, responsibilities, and waiver provisions.

b. SSP Processes and procedures. The SSP is a composite of the support resources that are required to support the system when fielded or deployed. The SSP will be evaluated as part of the LD during DT and tested and certified as appropriate during OT. To influence OT design plans, it is advisable that draft descriptions of the SSP be provided 18 months before the start of testing, followed by approved descriptions 14 months prior to test start.

(1) *SSP sufficiency.* The PM/PEO/MATDEV, in coordination with the system evaluator and testers, will ensure that the SSP is sufficient to permit evaluation of logistic supportability issues in the TEMP. The SSP does not include those logistic support resources and services required by the tester to sustain the continuity of tests and demonstrations (for example, test site facilities and administrative support vehicle available at the test activity).

(2) *SSP delivery.* A complete SSP will be delivered to the test activity at least 30 days prior to test training initiation. When the SSP includes items available in the Army inventory, the responsible PM/PEO/MATDEV will ensure the on-site availability of such items. Upon receipt, test activities will inventory the SSP and report shortages that will have a significant impact on the planned test to the independent evaluators or assessors, and the logistician at least 25 days prior to scheduled test training initiation. If the system evaluator determines that SSP shortages exist that prevent the adequate evaluation of any supportability-related issues, test start will be suspended until the complete SSP is available, or the materiel proponent obtains a waiver. The ATIRS will be used for reporting the SSP inventory.

(a) Draft SSP Component List (SSPCL) delivery. The PM/PEO/MATDEV will ensure a draft SSP Component List (SSPCL) is developed for any other test (developmental or operational) with critical supportability issues. The PM/MATDEV will furnish the draft SSPCL to the ILSMT or T&E WIPT members 90 days prior to test. They will review and identify SSP components required for each test in sufficient time for the PM/PEO/MATDEV to acquire and deliver the SSP.

(b) Final SSPCL delivery. At least 60 days prior to the test training initiation, the PEO/PM/MATDEV will provide two copies (or as otherwise specified) of the final SSPCL to the developmental and operational testers, system evaluator, logistician, CBTDEV, and any other interested activities.

6–58. New Equipment Training Test Support Package

Based on the New Equipment Training (NET) Program and with input from the TNGDEV, the PM/PEO/MATDEV prepares, as appropriate, a NET TSP. It provides an equipment-specific training program for the TNGDEV or subject matter expert (instructor and key personnel) to develop a training program to train troops who will be used in a specific test. The NET TSP contains a combination of equipment-specific documents, training aids, training devices, training simulators, programs of instruction (POIs), and lesson plans.

a. The NET TSP includes all training material required to train operators and maintainers on system peculiar tasks. The SSP should support the NET TSP and should be developed together with the NET TSP. Preparation of the NET TSP includes any contractor-developed training to be provided in support of operational testing. The NET TSP consists of the following sections: title of system, training aids (for example, transparencies, 35mm slides, student handouts, and

blackboard), POI and lesson plans (draft or final), technical manuals (draft, commercial or other), points of contact (POCs) (support agency's POC name and telephone number required for initial coordination), remarks reflecting clarification of the above items (for example, time schedules; support package components; additional support required to be placed in the system for test sustainment), and maintenance (including all maintenance charts and literature).

b. The PM/PEO/MATDEV will program, budget, and fund the preparation and execution of the NET TSP. This includes, but is not limited to, training courses, and travel and per diem for Instructor and Key Personnel Training (IKPT). The NET TSP should be planned, developed, and executed in coordination with the trainer and concurrently with the SSP.

c. The TNGDEV or training proponent should use the NET TSP to develop the Training TSP used by OT participants in support of OT execution. The developmental tester should use it in support of all DTs during the development process.

d. For non-tactical C4/IT systems, the NET TSP, if developed, should address both system hardware and software and be provided with the system to the FP for support of the planned testing assessments.

e. Milestones for providing NET TSP will be identified by the testers in either the TEMP or the OTP supporting the TSARC.

(1) The NET TSP should be provided to the developmental tester no later than 60 days prior to DT start. The milestone for delivery of the NET TSP to the developmental tester should be shown in the TEMP.

(2) The NET TSP should be provided no later than 180 days prior to start of training for an IOT. For NDI, the NET TSP should be provided no later than 60 days prior to start of training for the IOT. For EUT, LUT, and FOT, the NET TSP should be provided no later than 90 days prior to test start.

(3) To provide the best training possible, the system contractor may be allowed to train instructors as close to the start of training for start of IOT and FOT as feasible for knowledge retention purposes. Delivery of the NET TSP must still be timely to support delivery of the Training TSP 60 days prior to start of training for IOT and FOT. Training aids, to include vehicles, should be provided to instructors as early as possible prior to the training test start date to train test players. The 180-day lead time cited in (2) above is applicable for system contractor training. However, for NDI with more compressed milestone schedules, contractor training for the instructors may occur closer to start of the IOT. To ensure adequate planning, the PEO/PM/MATDEV should notify the available agencies as the acquisition strategy is developed and establish mutually satisfactory milestone goals.

(4) The NET TSP should be provided to the training developer as a package after completion of IKPT (which should be scheduled for completion 180 days prior (60 days when required for NDI) to the start of test player training in support of an IOT for a FRP DR.

(5) Deliveries of the NET TSP should be met even though the PEO/PM/MATDEV may use contractor support to develop the NET TSP.

6–59. Doctrinal and Organizational Test Support Package

The Doctrinal and Organizational (D&O) TSP can be prepared in support of both materiel systems development and C4I/IT systems development. The D&O TSP, provided by the CBTDEV, is used to expand, update, and add specificity to the information in the MNS and ORD documents to support planned operational tests required to support a scheduled decision review milestone.

a. The D&O TSP will mature as the system and its requirements mature. Early in the system's life cycle, the content will be less specifically defined and subject to rapid changes as different concepts and techniques of employment and support are identified and accepted. As additional knowledge about the system and its capability increases, the more mature the D&O TSP becomes. As much information as possible should be provided to ensure support of operational test objectives as determined by the CBTDEV.

b. A D&O TSP typically supports the conduct of a LUT, IOT, and FOT. A D&O TSP may also be necessary in support of CEP, FDT/E, and EUT (as determined by the CBTDEV, operational tester, and system evaluator), but content will vary based on test or experiment requirements. The D&O TSP should be updated before each major test during a system's development.

c. The D&O TSP should be thought of as a transfer of approved system acquisition documents (for example, OMS/MP) or draft new or changes to operations documents (for example, field manuals (FMs)). Therefore, the majority of the package should be filled by references to approved documents or attachments of draft documents (for example, draft FM change pages).

d. The D&O TSP consists of the following sections: references, means of employment, organization, logistics concepts, OMS/MP, test setting, and coordination. A suggested format for preparation of a D&O TSP is shown in figure 6–8. A majority of the details should be satisfied by references or attachments. When references are very large, specific pages/chapters should be identified to ensure appropriate use by the operational tester. A short paragraph should be provided for each item to help focus the tester to pertinent information.

1. **Title Page (type of test, system, and date).**
2. **References.** [1/]
3. **Means of Employment.** [2/]
   a. Field Manuals (FMs).
   b. Field Circulars (FCs).
   c. Training Circulars (TCS).
   d. Soldiers Manuals (SMs).
   e. Operators Manuals.
   f. Tactical Unit Standing Operating Procedures (TAC SOP).
   g. Communications-Electronic Operating Instructions (CEOI).
   h. Equipment Storage Plans (Load lists).
4. **Organization.** [3/]
   a. Basis of Issue Plan (BOIP).
   b. Qualitative and Quantitative Personnel Requirements Information (QQPRI).
   c. Organization Plan.
      (1) Introduction.
      (2) System Description.
      (3) Organizational Concept (Unit).
      (4) Operating Procedures.
5. **Logistics Concept.** [4/]
   a. Purpose.
   b. Source.
   c. Description.
   d. Supply.
   e. Transportation.
   f. Maintenance.
   g. Military Occupational Specialty by level of maintenance.
   h. Special tools and test equipment.
6. **Operational Mode Summary/Mission Profiles.** [5/]
7. **Test Setting.** [6/]
8. **Coordination.** [7/]

Footnotes:

[1/] References. The draft or approved MNS or ORD may be referenced or attached and all other documents supporting the D&O TSP appropriately referenced.

[2/] Means of Employment. This paragraph describes how the system will be employed and supported. It includes or references documents that describe the doctrine, tactics, techniques, logistical concepts and means of employment for the tested system, including a statement on new or revised versus current doctrine. The package should include sufficient detail to permit realistic system employment for conduct of the specified type test. It is used to guide the development of the SEP and to govern user actions during test. Also, when appropriate, related documents for the new system or equipment as well as support equipment should be shown as well as references or page changes to FMs, Field Circulars (FCs), Training Circulars (TCs), and operators manuals.

[3/] Organization. This element defines Military Occupational Specialty requirements, basis of issue, unit structure, organizational concept, operating concept, and lines of command or coordination for units employing the tested system. It is used in test planning to structure player units. When new Military Occupational Specialties are required, the specific duties of each Military Occupational Specialty level must be included in the D&O TSP. See AR 611-1, 30 Sep 97, regarding information for the development of this section. References to Basis of Issue Plan (BOIP), Quantitative and Qualitative Personnel Requirements Information (QQPRI), and Table of Organization and Equipment (TOE) apply.

Figure 6–8 (PAGE 1). Suggested format for a Doctrinal and Organizational TSP

[4/] Logistics Concepts. This paragraph describes the concept for planned supply, transportation, and maintenance procedures and methods for supporting the proposed or actual test system when fielded. If interim contractor support is planned in any form during initial fielding, then so state since laws govern system contractor or affiliates participation in IOT. References or draft change pages to appropriate FM apply. The concept will--

- Describe supply concepts envisioned for class I through X supply items and outline procedures for class IX repair parts availability for the system prescribed load list (PLL) including maintenance records, PLL records, requests for class IX items, and level of maintenance.
- Describe what supply and maintenance including repair parts and special tools will be provided to support testing.
- State system transportation procedures for rail, highway, marine and air movement with emphasis on new or changed requirements.
- State the Military Occupational Specialty and duty title for each required level of maintenance.
- Describe special tools and test equipment required to operate and maintain the system.
- Describe each level of maintenance responsibility during the test, that is, military personnel, Department of Army civilian employees or contractor personnel.
- Describe warranty procedures to be used to ensure maintenance conformity.
- Include coordination annexes listing the agencies through which the logistics concept was staffed and showing their comments. The logistics concept should be compatible with concepts, policies, and system support stated in AR 700-127 and AR 750-1. This section of the D&O TSP excludes the SSP by the PEO/PM/MATDEV but it should be compatible with the SSP.

[5/] Operational Mode Summary/Mission Profile (OMS/MP). This section presents a description of the anticipated mix of ways the new equipment will carry out its operational role. It includes the operational events and environment the equipment experiences from beginning to end of a specific mission laid out in a time-phased approach. Additionally, as required to satisfy the purpose of test, a set of operational mission profiles (that is, attack, defense) should be shown. This section is prepared by the CBTDEV or FP in coordination with the operational tester, to support the operational requirement. Details that should also be included or discussed for non-tactical C4/IT systems are workload, environment, mobilization, continuity of operations, data loss, and system peculiar events.

[6/] Test Setting. This paragraph should describe total environment (that is, tactical, threat, terrain, weather, and logistical support) under which the system is to be examined. The test setting defines the interactions among threat, friendly actions, and the environment (or some specific geographic location) and establishes a scenario that subjects the system under test in the context of its total environment, to include the next higher level system or organization. The test setting should be compatible with the Threat TSP. Also, the size of unit, OPFOR, and equivalent scale of operations should be stated. Reference any combat developer or standard scenario, whichever is applicable.

[7/] Coordination. This paragraph indicates the organizations that normally should be provided the D&O TSP for review and comment. The final D&O TSP should contain an enclosure or appendix, which details the results of the coordination. The combat developer or functional proponent should establish appropriate coordination requirements and all coordination schedules to support timely completion of the D&O TSP prior to approval. Information contained in the D&O TSP already approved should be annotated as such.

Figure 6–8 (PAGE 2). Suggested format for a Doctrinal and Organizational TSP—Continued

e. The CBTDEV is responsible for planning and development of the D&O TSP for each materiel system (or C4I/IT system) undergoing acquisition. The operational tester should assist CBTDEV in preparing the test setting (for example, scenarios and profiles) and concept of test employment. It is recommended that the Draft D&O TSP, to include the OMS/MP, be provided to the operational tester 27 months prior to the start of an IOT, a LUT, or FOT or as agreed to by the T&E WIPT (or as agreed to between the CBTDEV and operational tester prior to the start of a CEP test, EUT, or FDT/E), and as shown in TSARC OTP. The CBTDEV must approve all D&O TSPs.

f. A checklist is provided at figure 6–9 for use by the preparer of the D&O TSP to ensure that basic contents of the TSP are addressed.

6–60. Threat Test Support Package

Proponent CBTDEVs and MATDEVs provide threat support, including validation, to Army testing of new materiel and systems. (See AR 381–11 and app Y of this pamphlet.) The proponent threat support office will provide threat support by participating in test planning, preparing the Threat TSP, providing training required by units portraying threat forces, and providing on-site monitoring of the threat portrayal prior to and during the test. This applies to all DTs, OTs, and other tests conducted in an operational setting.

a. Guidance regarding Threat TSP content and format is contained in AR 381–11. Figure 6–10 provides a suggested preliminary package format for use as a guide during Threat TSP preparation.

b. A Threat TSP will be prepared when an operational threat is required for DT and OT of ACAT I and ACAT II systems, and other systems on the OSD T&E Oversight List. Specific testing requirements for a given system will be determined by the T&E WIPT. Determination of the requirement for an operationally realistic portrayal will be made by the T&E WIPT upon the recommendation of the evaluation organization based on the requirements of the TEMP.

c. The initial Threat TSP (minus test-specific annexes) is developed after Milestone A by the CBTDEV or threat support organization to support future testing for a specific system or concept. This Threat TSP is derived from the system threat assessment report (STAR) or system threat assessment (STA). The initial Threat TSP is more detailed than the STAR or STA and provides the threat scenarios to support a specific test and assesses the impacts of threat-related test limitations. To support DT requirements, the PEO/PM/MATDEV proponent (threat support organization/ office) will expand and tailor the initial Threat TSP for each test in which threat force operations are to be portrayed realistically. For OT, the CBTDEV or threat support activity will expand and tailor the initial Threat TSP for each OT requiring a realistic threat portrayal.

d. The final Threat TSP includes an update of the initial Threat TSP plus a section of several appendices that are developed on an iterative basis to support specific tests approved by the TEMP. The appendices become part of the Threat TSP and must be completed before final Threat TSP approval can be granted.

e. As a member of the T&E WIPT for ACAT I systems, ACAT II systems, and OSD T&E oversight systems, the DA Threat Integration Staff Officer (TISO) advises threat representatives from the CBTDEV and MATDEV of tests scheduled and the anticipated threat support the requirements at the initial TCG meeting. TRADOC Threat Managers and AMC Foreign Intelligence Officers serve as the principal threat integrators for OTs and DTs, respectively.

f. Threat TSPs for ACAT III systems not on the OSD T&E Oversight List will be provided by the CBTDEV or MATDEV, as appropriate, when threat portrayal is required by the T&E WIPT for a DT or OT.

g. When approved, the Threat TSP describes the threat to be used for planning and developing the test and portrayed during test execution. An approved Threat TSP, however, does not ensure that test threat portrayal is valid. Two separate approval actions are required, one for the Threat TSP and one for the threat portrayal during the test. The approved threat is included in the approved T&E plan prior to execution of test.

h. See AR 381–11 for additional procedural and process guidance for Threat TSPs.

6–61. Training Test Support Package (Training TSP)

The Training TSP is provided to the test agency by the proponent developers of the new system. A Training TSP is assembled by the proponent training developer for each affected operator and maintainer Military Occupational Specialty. Where there are system cross proponent responsibilities, the proponent for the requirement will assemble training materials for supporting Military Occupational Specialty. The lead proponent will consolidate the package and ensure it does not contain conflicting requirements. The Training TSP contains information used by the trainer to train test players and for the tester's use in evaluating training on a new materiel system. It focuses on the performance of specific individual and collective tasks during operational testing of a system. The Training TSP package should be updated prior to each EUT, LUT, IOT, and FOT during a system's development, or as required by the TEMP or OTP. Training TSP for non-tactical C4/IT and space systems should be tailored to the skills and abilities of the target audience scheduled to use the system. If there is no specified Military Occupational Specialty to use the information system, training should be addressed and the users described.

CHECKLIST FOR DOCTRINAL AND ORGANIZATIONAL TEST SUPPORT PACKAGE (D&O TSP)

1. Following is a list of items to consider during preparation and review of D&O TSP:
   a. References and title page. Administrative information and ORD/TSARC references (current and available).
   b. Means of Employment.
      (1) Does the D&O TSP provide a complete, current listing of the doctrinal materiel that will be required for the new system at the unit level (for example, FMs, FCs, TCs, SMs, operators manuals (may be included in the SSP), TAC SOPs, CEOIs, and load plans?
      (2) Does the D&O TSP provide a listing of the doctrinal material used at staff levels above the operating unit that must be changed or augmented to support fielding of the system? Interoperability?
      (3) Are drafts of, or changes to the listed or referenced documents included in the D&O TSP?
      (4) Is the draft documentation such that it addresses system employment and permits development of the SEP, EDP, DTP and other T&E planning documents (for example, TEMP and COIC)?
      (5) Are dates for delivery of the Tactical SOP, communication/electronic, and loading instructions and plans established?
      (6) Does the scope state the tactical scenario?
   c. Organization.
      (1) Are draft or final TOEs for units employing the system up to battalion level or equivalent included? BOIP, QQPRI referenced?
      (2) Does the D&O TSP include a detailed description of the operational concept for employing the system in combat to include lines of communication and coordination through division level?
      (3) Does the D&O TSP describe each of the system employment options (that is, direct support, general support, and attachment)?
      (4) Are the operating procedures for each option described in detail?
      (5) Are the lines of C3 for the system clearly delineated?
      (6) Are the degraded mode(s) of operation described in detail?
      (7) Are the various communications options (for example, wire, radio (voice, digital data, and secure), and facsimile.) described?
      (8) Are related operational and organizational concepts included in the D&O TSP? This applies when the system under development/test is used in conjunction with or to employ other systems. An example of a system requiring special treatment is the Fire Support Team Vehicle (FISTV), which in addition to its usual field artillery missions may be required to employ Hellfire missiles, U.S. Air Force laser guided, and conventional weapons and other systems. The D&O TSP should include the employment concepts for each such related system.
      (9) Are Military Occupational Specialties discussed?
   d. Logistics Concept.
      (1) Is the logistics concept for the system through the direct support level incorporated into draft FMs and support documents?
      (2) Is the logistics concept shown in FM (draft/final)?
      (3) Is the logistics concept detailed enough so that IOT and FOT can assess supportability through the direct support level?
      (4) Are all major logistical areas included (for example, supply, maintenance, and transportation).
      (5) Does the logistics concept include procedures for use of operational readiness floats (ORF)?
      (6) Type of support stated (troop, contract)?
      (7) Are there environmental impacts (for example, manufacturing, supply, maintenance, repair, and disposal actions)?

Figure 6–9 (PAGE 1). Doctrinal and Organizational TSP checklist

e. Operational Mode Summary/Mission Profile.
(1) Has the OMS/MP been expanded or updated since the last operational test or publication of the ORD?
(2) Does the OMS/MP describe the events and frequency of occurrence and duration events in attack, defense, exploitation and retrograde operations? State alternate missions?
(3) Does the OMS/MP state the frequency and duration of responses to threat use of countermeasure such electronic warfare or radio electronic combat, obscurants, and NBC weapons?

f. Test Setting.
(1) Does the setting detail friendly and threat force actions down to the unit level?
(2) Are the probable areas of employment for the proposed system stated?
(3) Does the setting state the primary areas of employment for the proposed system?
(4) Is the approved scenario on which the test setting is based referenced? (Include sequence number and date of the scenario).
(5) Does the setting state or relate to a standard scenario and threat support package?
(6) Does the test setting identify the type force structure for the proposed system?

2. After finalizing contents, ensure that adequate coordination is accomplished.

Figure 6–9 (PAGE 2). Doctrinal and Organizational TSP checklist—Continued

1. **Title page.** (Preparing agency, information cutoff date, U.S. system project office, and the MACOM or DA validation date).
2. **Tables of contents and illustrations.**
3. **Section I Background Information.**
   a. Description of system, organization or concept to be tested.
   b. Type of test.
   c. Evaluating agency.
   d. Test organization.
   e. TRADOC proponent school.
   f. Test dates.
   g. Test location.
   h. Simulated location (for example, central Europe).
   i. IOC of system being tested.
   j. Threat year.
4. **Section II Critical Operational Issues and Criteria/Additional Issues/Measures.**
5. **Section III Threat.**
   a. Specific threat systems and units/organizations.
   b. Threat tactics, doctrine, techniques, procedures and flight profiles, as appropriate.
   c. Threat countermeasures.
6. **Section IV Test Specific Appendices.**
   a. Appendix A: Test concept (Draft of SEP).
   b. Appendix B: Scenario.
   c. Appendix C: Description of trials/test runs/vignettes.
   d. Appendix D: Fire/target matrix.
   e. Appendix E: Targets, threat simulators, and surrogates.
   f. Appendix F: Limitations.
   g. Appendix G: Threat force training plan.

Figure 6–10. Suggested format for a Threat TSP

a. Training TSPs usually consist of an initial submission and a final submission. The Training TSP items identified below will be submitted for approval to HQ TRADOC or Major Army Commands (MACOMs) assigned responsibility for non-TRADOC systems.

(1) The initial Training TSP contains the items listed below.

(a) System Training Plan (STRAP). The STRAP should be approved by HQ TRADOC prior to including it in the Training TSP. Approval of the Training TSP should not be construed as approval of the STRAP.

(b) Test training certification plan. The plan outlines and describes the method and procedures for evaluating and certifying individual and collective pre-test training. Specifically, it describes the who, where, and how training is certified.

(c) Training data requirements. Data requirements and milestones should be identified.

(2) The final Training TSP contains the items listed below.

(a) Training schedule.

(b) POI for each Military Occupational Specialty/SSI affected.

(c) The Army External Evaluation/Mission Training Plan (MTP) or changes to.

(d) List of training devices, embedded training components, and simulators.

(e) Target audience description.

(f) Soldier training publications or changes.

(g) Crew drills.

(h) Lesson plans.

(i) Ammunition, targets, and ranges required for training.

(j) Critical Military Occupational Specialty task list.

(k) FMs or changes to FMs.

b. The proponent training developer develops, coordinates, and provides the Training TSP to the test agency. Logistics oriented schools and non-proponent schools that manage Military Occupational Specialties involved with the new system develop Training TSP input (for example, POI; Lesson plans; STRAP changes; training data requirements; External Evaluation/MTP changes; target audience descriptions; crew drills; ammunition; targets and ranges required for training; and critical task list) to the lead proponent. This is in addition to the NET TSP provided by the materiel developer. All Training TSP input must be provided in sufficient time from responsible agencies to the training developer according to the following initial and final submission Training TSP paragraphs, below, to allow the Training TSP to be submitted on time to the tester. When required, a Training TSP for an information system will be prepared as specified by the training proponent for the information system under development. The Training TSP may provide or make reference to supporting documentation to the TSP. Attachments depend on availability of referenced documents.

(1) *Initial submission.* The initial Training TSP consists of the draft STRAP or training data requirements, and the Certification Plan. It provides the test agency with the training concept for the system, the training issues upon which the trainer requires data, and the method for training test players. The initial submission is due to the test agency from Test (T) start minus (−) T–18 months, or as specified in the OTP.

(2) *Final submission.* The Training TSP is prepared following IKPT and receipt of the NET TSP. It should be available 60 days prior to the commencement of test player training and the OTRR 2.

(3) *Functions.*

(a) The training developer/proponent—

— Provides guidance on preparation, coordination, approval, and distribution of the Training TSP.
— Serves as approving authority for all STRAPs and Training TSPs.
— Serves as the training developer policy element for the STRAP and the Training TSP.
— Prepares initial and final Training TSPs in coordination with supporting schools.
— Forwards approved copies of initial and final Training TSPs to the tester.

(b) The operational test and evaluation activity—

— Reviews the draft Training TSP and provides comments to proponents.
— Ensures the Training TSP is included as part of the SEP development process.
— Ensures all training is completed prior to start of test.

c. Figure 6–11 provides a checklist to use in preparing the Training TSP.

CHECKLIST FOR TRAINING TEST SUPPORT PACKAGE
(Training TSP)

1. Initial Submission of the Training TSP.

a. Were development procedures followed for the STRAP?

b. Did the STRAP address:

(1) The system description?

(2) Assumptions?

(3) The training concept?

(4) The training device strategy?

(5) Significant training issues at risk?

c. Did the Test Training Certification Plan describe the method and procedures for evaluating and certifying individual and collective pre-test training? Specifically, did it describe the who, where, and how training is to be accomplished and the method of certification?

d. Were the STRAP and Test Training Certification Plan submitted within the time frame prescribed?

e. Did the Training Data Requirements provide training issues outlining the need for data on individual/collective performance, and technical manuals?

2. Final Submission.

a. Is final Training TSP submitted to HQ TRADOC at least 60 days prior to the test date?

b. Does the final Training TSP include:

(1) The training schedule?

(2) The POI for each Military Occupational Specialty/SSI affected?

(3) FMs/FM Changes References?

(4) The ARTEP/MTP or changes to the ARTEP/MTP?

(5) A list of training devices, embedded training components, and simulators?

(6) A target audience description?

(7) Soldier training publications or changes?

(8) Crew drills?

(9) Lessons Plans?

(10) A list of ammunition, targets, and ranges required for training?

(11) A critical task list?

c. Does the Training TSP include information from each Military Occupational Specialty proponent school affected?

d. Does the Training TSP lay out who is responsible for training those tasks taught in the institution and unit?

e. Does the Training TSP contain all of the material needed to train test players on operator and maintainer tasks?

f. Is field training necessary? Does it train operator crews to operate the system to its desired capability? Is night training appropriate?

g. Are TTPs taught to test players? Does it agree with the employment described in doctrinal manuals?

Figure 6–11 (PAGE 1). Training Test Support Package checklist

h. Is there sufficient time built into the training schedule for the unit to become proficient with the system?
i. Will training devices be available to support test training?
j. How much ammunition is required to support training? Is it supportable?
k. Is the test player a "typical soldier" in his career field?

Figure 6–11 (PAGE 2). Training Test Support Package checklist—Continued

Section V
System Safety Testing

6–62. Overview of system safety testing

One of the most important aspects of testing is verification of the elimination or control of safety and health hazards. Testing must include consideration of equipment and man-related failure. For example, are the failures related to mechanical, electrical, or chemical malfunctions or are the failures the result of man/item incompatibility, inadequacy of procedural guidance, or inappropriate or inadequate training, selection or orientation of personnel. (See app N.) There are no set rules or data lists established for safety requirements. However, because of similarities in categories of equipment, testers can establish operating procedures and sound engineering judgment can be applied. These initial areas are summarized at figure 6–12.

* Performance Requirements:
  - Man/item performance (speed, braking, range, and accuracy)
  - Levels of operator/maintainer training
  - Combat versus non-combat use

* Operational Conditions:
  - Location (land, sea, or air)
  - Climatic conditions (rain, cold, fog)
  - Types of Terrain (hills, desert, vegetation)
  - Time (daylight, night, continuous)
  - Command and control (communication)
  - Man-machine interface

* Hazard Considerations:
  - Noise level
  - Noxious fumes and gases
  - Mechanical hazards
  - Electrical hazards
  - NBC hazards
  - Fire hazards
  - Explosive hazards
  - Procedural hazards
  - Emergency procedures

Figure 6–12. Initial areas of safety consideration

6–63. Safety and developmental testing

To obtain the necessary data, the tester must, in most cases, observe test personnel performing the tasks required of an operator or maintainer. Until the safety envelope has been determined by operating the item near the maximum safe limit, a thorough understanding of what the operator/maintainer has to do with, on, in, and around an item is unknown and critical hazards could exist. This is especially true of software controlled systems, where predictable and safe responses must result from computer failure, maintenance interlocks, power failures, and power-up tests.

a. A subtest entitled "Safety and Health Hazards" is included in the test plan. Subtests for the analysis of safety parameters of systems and for developing Safety Release recommendations and other safety verification documents will reflect, as a minimum, safety test provisions of AR 385–16 and MIL–STD–882. A comprehensive subtest will be designed to establish the safety of the system including the following essential features:

(1) Preliminary examinations, review of the Safety Assessment Report, and limited tests necessary to certify through a Safety Release that the system is safe for further testing.

(2) Selected physical performance and reliability tests to verify that the system under test satisfies minimum design and construction requirements for safe field deployment.

(3) Systematic observations and analyses of the system throughout all phases of developmental testing to identify and investigate any actual or potential hazards to personnel and equipment that may result from operation and maintenance of the system by representative users.

b. The test officer considers the following four areas of safety:

(1) Range safety ensures that test operations are conducted safely. The test officer ensures range safety with the support of safety personnel such as range control and the safety officer.

(2) Industrial rules governing vehicle safety, shop safety, and toxic substance safety primarily come from the test center safety office, OSHA Standards, and the HQDA and ATEC safety regulations and manuals. The test officer should be familiar with or obtain information on the rules governing the type of equipment being tested.

(3) Verification of equipment safety involves a compilation and analysis of all information provided to the test center and data generated by that center. The test officer will ensure that adequate testing is conducted to provide an accurate assessment of the safety of the test item. The safety evaluation subtests should be conducted to determine and verify that the item is safe. Exposure of test personnel will be held to an absolute minimum.

(4) The test officer should ensure testing is conducted within the guidelines of TSG/CHPPM and that Human Use Committee (HUC) Review and statements of informed consent are obtained when required.

c. Developmental testing to provide safety data to support the Safety Release is front-loaded (that is, the test is designed so that safety data can be collected as early in the DT as possible). Specific safety tests are also performed on critical devices or components to determine the nature and extent of hazards presented by the materiel. Special attention is directed to—

(1) Verifying the adequacy of safety and warning devices and other measures employed to control hazards.

(2) Analyzing the adequacy of hazard warning labels on equipment and warnings, precautions, and control procedures in equipment publications.

d. Figure 6–13 reflects the minimum requirements regarding safety prior to initiation of Government developmental testing.

e. The process to request a Safety Release from DTC is as follows - Requests should be submitted as soon as the Safety Release requirement is known to DTC, ATTN: CSTE–DTC–TT–B (or to the appropriate test division, if known). Planning during the T&E WIPT process will provide DTC the opportunity to ensure the necessary testing is being done to provide data for the Safety Release. Include the following documents/information, if available:

(1) Safety Assessment Report.

(2) Health Hazard Assessment Report.

(3) All test data available regarding the item requiring the Safety Release. If no current test data are available, any other information that can be used (for example, prior Government test data, contractor test data), with the emphasis on safety data.

(4) Environmental documentation.

(5) Training plans.

(6) Equipment publications.

(7) Mission scenario/mission profile.

(8) Test Plan.

(9) Source of troops involved in operational testing.

(10) Test and Evaluation Master Plan.

(11) When sufficient data are not available on which to base a Safety Release, it may be necessary that additional testing be done. In such cases, required testing will be performed by DTC and test costs will be paid by the materiel

developer. The time required for issuing a Safety Release would increase accordingly. DTC will issue the Safety Release to the operational test activity with a copy furnished to TRADOC.

Safety Assessment Report (SAR) - must be thoroughly reviewed. The SAR should be available 60 days prior to test start.

Safety Standing Operating Procedures or Internal Operating Procedures (IOP) -for any hazardous operations, such as tests involving explosives, SOPs or IOPs must be developed and approved by the appropriate authority.

Precautions - are taken to protect personnel and equipment during tests.

Hazard Tracking List - is reviewed to identify the remedies that have been applied to correct previously identified hazards. Safety tests in developmental testing verify the adequacy of the remedy.

Environmental data - is reviewed to determine if the parameters are correct (for example, all systems are required to operate in the basic environment per AR 70-38). In addition, personnel have certain anthropometric characteristics that the system and the environment created by the system must take into consideration (for example, vibration created by operating the system must be below the "uncomfortable" range to prevent possible internal injury).

Human Use Committee - Review conducted for those tests performed by personnel who are not "testers by duty assignment" (for example, non-professional testers).

Independent Safety Assessment - prepared by the USASC and forwarded to the AAE assessing the risk of the residual hazards in a system prior to the MDR's.

Figure 6–13. Minimum safety requirements done to provide data for the Safety Release

6–64. Safety Release

OT, including pretest system training, demonstrations, experiments, and DT involving soldiers will not begin until the test agency, the trainer, and the commander who is providing the soldiers have received a Safety Release. The Safety Release is developed at least 30 days prior to pretest training and at least 60 days prior to all types of OT and DT that expose soldiers to training and testing activities involving the research, development, operation, maintenance, repair, or support of operational and training materiel. This requires that pertinent data (for example, results of safety testing, and hazard classification) be provided to the Safety Release authority in sufficient time to perform this testing or determine if additional testing is required.

a. Copies of the Safety Release are also issued to the system evaluator, CBTDEV, and PM. DTC does not provide the Safety Release for systems developed by MEDCOM.

b. The Safety Release indicates the system is safe for use and maintenance during the specified test by typical user troops and describes the specific hazards of the system based on test results, inspections, and system safety analyses. Operational limits and precautions are also included. The requirement for a Safety Release also applies to testing of new or innovative procedures (for example, doctrine and TTP) for the use of materiel that has been type classified. Safety Releases are not required for use of standard equipment in the normal prescribed manner.

c. A Conditional Safety Release is issued when further safety data are pending or operational restrictions are required that restrict certain aspects of the test (for example, a restriction on range fan area until all range safety tests are completed).

d. A Limited Safety Release is issued on one particular system (that is, prototype, model, modification, and software revision) or for one particular test.

e. The tester uses the information contained in the Safety Release to integrate safety into test controls and procedures and to determine if the test objectives can be met within these limits.

f. When unusual health hazards exist, The Surgeon General reviews or participates in preparation of Safety Releases to ensure safety of user troops during operational testing.

g. The Safety Release format is reflected in AR 385–16.

6–65. Safety Confirmation

The Safety Confirmation is prepared by ATEC's DTC and appended to the SER. It is also provided to the PM, AMC Safety Office, and the U.S. Army Safety Center. It indicates if specific safety requirements are met and includes a risk assessment for those hazards not adequately controlled. It lists any technical or operational limitations or precautions as well as highlighting any safety problems that require further investigation and testing. Earlier safety confirmations may be provided at major acquisition milestone junctures. See appendix N for additional information.

Section VI
Interoperability and Certification Testing

6–66. Overview of interoperability and certification testing

DODD 5000.1, DODD 4630.5, DODI 4630.8, and CJCSI 6212.01 require that all acquired systems be interoperable with other U.S. and allied systems, as defined in the requirements and interoperability documents. Interoperability issues are considered during development of the T&E strategy. U.S. Message Text Format (USMTF), Tactical Data Links (TDL) provide standardized messaging capabilities and enable seamless interoperability within the infosphere.

a. The TEMP includes at least one CTP and one operational effectiveness issue for evaluation of interoperability. (See chap 3.)

b. The system evaluator reviews the major documents that define the system's interoperability environment and monitors the major events that produce information on compatibility and interoperability. The following are the potential sources of interoperability information:

(1) Army Battlefield Interface Concept (ABIC) is produced by the CBTDEV (usually TRADOC) and identifies the intra-Army, inter-Service, and NATO systems architecture and associated interfaces. It serves as the primary document that defines the systems with which a developing system is expected to operate.

(2) Information Exchange Requirements (IERs) are developed by the CBTDEV, documented in the C4ISP, and provide quantifiable data to characterize each required information exchange.

(3) Technical Interface Design Plans (TIDPs) are the technical design documents for each interface. They are developed by the MATDEV and provide the technical interface parameters, message formats, message content, and implementation requirements.

(4) Interface specifications are developed by the MATDEV and provide detailed technical engineering information on system interfaces.

(5) Interface Control Documents (ICDs) are developed by the MATDEV and describe the physical and electrical connections, voltage, and current requirements, and provide interface control drawings. ICDs are a source of data for operational evaluation.

(6) Interface operating procedures (IOPs) are developed by the MATDEV and describe the man-machine interfaces and standardized operating procedures for multiple interfacing systems. For NATO system interfaces, interoperability is guided by Standardization Agreements (STANAGs).

(7) Operator and user handbooks are developed in parallel with the system by the MATDEV in coordination with the user, and provide SOPs and user procedures relevant to the operation of the system.

c. The ORD, C4ISP, and ABIC enable the system evaluator to identify the interfacing systems and the systems for which interface is a concern. The ORD and IERs are used to identify the factors and conditions that have the potential to impact the system's interoperability requirements. Compatibility issues are identified by the system evaluator based on review of the IERs and the description of the environment from the ORD.

6–67. Joint/Combined/NATO certification overview

All National Security Systems (NSS) and Information Technology systems (ITS), regardless of Milestone A, B, and/or C, must be tested and testing results certified by DISA, JITC. Joint Certification Testing can be performed in conjunction with other testing with the U.S. Army CECOM SEC APTU and the US Army AMCOM SED aviation, air, and missile defense participating systems whenever possible to conserve resources. Interoperability evaluation and testing is conducted throughout the life cycle of NSS and C4I/IT systems and interfaces but should be achieved as early as practical to support scheduled procurement decisions.

6–68. U.S. Army-CECOM Software Engineering Center Army Participating Test Unit Coordinator's role in the Joint/Combined/NATO certification testing requirements

Joint and DOD Directives have directed that "all C4I systems developed for use by U.S. forces are considered to be for joint use." The Joint Chiefs of Staff have published the TADIL Links 11/11B/16 MIL–STD 6011B, MIL–STD 6016A, USMTF MIL–STD 6040, Joint Variable Message Text Format (JVMF) Technical Interface Design Plan (TIDP) Test

Edition (TE), and NATO STANAG 5516 that are designed to ensure systems meet end users' information exchange needs as well as their interoperability requirements. The FRP DR now depends on successful joint interoperability certification. Joint/Combined/NATO certification requirement policies are stated in the following documents:

— DOD Directive 4630.5.
— DOD Instruction 4630.8.
— CJCSI 6212.01B.
— JITC PLAN 3006.
— AR 73–1.
— CECOM Regulation 10–1.
— STANAG 5516.

6–69. North Atlantic Treaty Organization interoperability testing

North Atlantic Treaty Organization (NATO) interoperability testing is required as part of the NATO policy for command, control, communications and intelligence (C3I). Army participation in NATO interoperability testing is coordinated through the Army Participating Test Unit (APTU). Testing methodology is defined in the NATO Interoperability Framework (NIF), which delegates its NATO IP Environment (NIE) testing to the NIE Testing Working Group (NIETWG). The NATO Interoperability Environment Testing Infrastructure (NIETI) coordinates the NATO Interoperability Testing Program. Within the NIETWG, the Tactical Data Link Interoperability Testing Syndicate (TDLITS) is responsible for the testing of TDLs. The Program of Work for the TDLITS will be coordinated by the NIETI, once this organization is fully established. See figure 6–14.

CHECKLIST FOR NATO TESTING

Following is a list of items, which must be in place for systems participating in NATO testing:

1. The TDLITS will review applicable system documentation, which includes:
   a. Requirements documents (that is, MNS and ORD, to include IERs)
   b. Concept of Operations (CONOPS)
   c. Standard NATO Agreements (STANAGs)
   d. System Interface Design Documents (SIDDs)
   e. Allied Data Publications (ADatP)

2. Prior to testing, the TDLITS will review previous NIETI or other nation's test results to include all NATO nations and organizations, agencies one-on-one test results.

3. Test types (as specified by the Test Director (TD)) include both NIE Standards and Implementation Testing. In addition to these test types, there are four levels of testing, which include paper-based, rig-based, live, and simulation.

4. Test Cycle
   a. Objectives and procedures - The TDLITS establishes the test objectives and works with the TD and participating nations to develop test procedures or serials that meet specific test requirements.
   b. Pre-test coordination - All participants review and approve the NTDLIOT test procedures. Pre-test reviews are conducted two weeks prior to testing, and include a last minute review of the test procedures and overall test conduct.
   c. Control - The NATO Tactical Data Link Interoperability Test TD (NTDLIOT) controls test conduct in co-ordination with the National TD (NTD). The test is conducted by exchanging messages based on test events and stimulating sensors to test conformance and confirming interoperability in accordance with applicable STANAGs and approved Data Link Change Proposals (DLCPs).
   d. Monitoring - During the TDL test execution, the systems and the NTDLIOT TD monitors, records and extracts test data to support post test analysis.
   e. Test integrity - Participating systems should not be altered during a test without explicit concurrence of the NTDLIOT TD and the nation's TD.
   f. Multi-link and special requirements - If nations are capable of operating simultaneously on multiple data links (for example, to perform concurrent operations), providing data translations from one message to another standard to another (such as forwarding from Link 11 to Link 16), these capabilities will be tested during NTDLIOTs, if resources are available to do so.
   g. Test Analysis - Post test procedures (Preliminary Trouble Reports, Trouble Reports, ARP conduct and Test Reporting) shall be in accordance with the NATO C3 Interoperability Environment Testing Concept. The NATDLIOT TD is responsible for preparing both the final test procedure and the test report. The NATDLIOT TD will also collect all relevant recorded data and test results and will transfer these together with the test procedures to appropriate media for storage and retrieval purposes.

Figure 6–14. Checklist for NATO testing

6–70. Tactical data links testing process

a. Army Participating Test Unit Coordinator. CECOM SEC is the Army Participating Test Unit Coordinator (APTUC). In this role, the SEC represents the Army at all the Joint Message Standards/Certification forums to include the Joint Configuration Control Board (CCB) and other Joint Working Group Meetings. SEC APTUC is the focal point for configuration management of all the joint message standards and joint certification testing. U.S. Army PMs/PEOs coordinate through the U.S. Army AMCOM SED, as appropriate, to CECOM SEC APTUC and JITC for systems to be certified in joint/combined/NATO areas. A Master Test Schedule is developed so that the PMs/PEOs will have a scheduled place for their system early in program development. The certification process is divided into three phases:

(1) *Pre-test.*

(a) Assures Army participation in review and submission of inputs to joint interoperability test documents.

(b) Coordinates the dissemination of test documentation.

(2) *Test.*

(a) Supports the joint test by providing technical and engineering support.

(b) Analyzes, evaluates and records data produced during joint testing for Army systems.

(3) *Post test.*

(a) Writes Preliminary Trouble Reports (PTRs) as a result of test analysis and evaluation. Prepares PTRs for transmission to the JITC and other participating Army units.

(b) Attends Joint Analysis Review Panel (JARP) and serves as the Army's spokesperson or voting member. Also provides technical support to the Army Systems.

(c) Assigns trouble reports to all valid problems and assign criticality category per table 6–6.

b. Problem Probability Assignment. All Trouble Reports (TRs) will be assigned a probability of occurrence (A through E) by the JARP based upon criteria presented in table 6–7.

c. Trouble Report Risk Assessment. Trouble report risk assessment will be made by the JARP based on the identified severity and probability of occurrence. Table 6–8 presents the possible combinations of severity and probability that equate to a resultant risk assessment. Based on JARP concurrence, the JITC will assign a high, medium, or low risk assessment to TRs prior to delivery to sites/programs for further adjudication.

Table 6–6
Severity and joint task force impact

Category	Definition	Joint Task Force (JTF) Impact
1	Prevents the operator's accomplishment of an operational or mission essential function or which jeopardizes personnel safety.	JTF operations and/or communications cannot be completed, or personnel safety jeopardized.
2	Adversely affects the accomplishment of an operational or mission essential function so as to degrade performance and for which no alternative "work-around" solution exists.	JTF operations and/or communications are severely degraded. No acceptable tactics, techniques & procedures (TTPs) exist.
3	Adversely affects the accomplishments of an operational or mission essential function and for which there is a "reasonable" alternative work-around solution.	Problem has the potential to severely degrade JTF operations or communications, but operators consider TTP acceptable.
4	Operator inconvenience or annoyance	JTF operations and/or communications are slightly degraded but all ops may proceed.
5	All others.	JTF operations and/or communications are not impacted but enhancement is desirable.

Table 6–7
Probability of occurrence

Probability	Level	Probability description
Frequent	A	Likely to occur frequently, essentially equal to a probability of 1.
Probable	B	Will occur several times during a test event.
Occasional	C	Likely to occur sometime during a test event, essentially equal to a probability of 0.5.
Remote	D	Unlikely to occur during a test event, but possible.
Improbable	E	Extremely unlikely to occur, essentially equal to a probability of zero.

Table 6–8
Trouble report risk assessment

	Severity category				
Probability level	1	2	3	4	5
A - Frequent	I	I	II	II	III
B - Probable	I	I	II	II	III
C - Occasional	II	II	III	III	IV
D - Remote	II	II	III	IV	IV
E - Improbable	III	III	III	IV	IV

Legend for Table 6-8:
I. Very High Risk—Must Resolve ASAP
II. High Risk—Immediate Resolution Desirable
III. Manageable Risk—Resolution Can Be Delayed
IV. Low risk—Resolution Not Required

Section VII
Instrumentation, Targets, and Threat Simulators

6–71. Instrumentation, targets, and threat simulators requirements
Every test requires an element of ITTS. Acquisition of ITTS follows AR 70–1.

6–72. Instrumentation, targets, and threat simulators planning
Appendix Z discusses the planning of ITTS to meet T&E requirements. It outlines the relationships of key activities involved in planning, managing, and using ITTS in support of T&E. It also identifies key inventory and capability accounting systems, describes procedures for asset scheduling and use, and identifies existing Army major range and test facilities, major instrumentation, and test equipment. Appendix Z identifies assets by location, value, capability, and points of contacts to provide the test community with a readily available list of assets.